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DIGEST



MARCH 1981

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COOP'S COMMENT ON TECHNOLOGY

MEANINGFUL NUMBERS

Several months ago in their Paraframe advertisement appearing here in **CSD** innovative Jim Vines adopted a novel way of describing the system sensitivity of his ET 4.85 meter antenna system. I had discussed this approach with Jim before he prepared his advertising copy but take no credit for the creativity; the concept is entirely Jim's alone.

Paraframe ads now tell you exactly where your receiver threshold will show up if you use their various antennas with specified receiver thresholds and LNA noise temperatures. For example, with their 4.85 meter antenna if you combine the dish with an 8 dB threshold receiver (such as the Washburn) and a 100°K LNA Jim says you will be 'out of the sparklies' (i.e. noise free on programming material) with a 29.0 dBw EIRP from the bird. And with their 'Caribbean Conqueror' 6.0 meter antenna the EIRP for the same performance can be anything in the 27.1 dBw range or greater.

I have discussed this approach to defining system sensitivity with others and have found an understanding of what Jim is saying lacking. So I'd like to try to explain it to you since I am hopeful that this approach to 'truth-in-advertising' may catch on with others who offer antennas and sell packages.

RCA, Western Union and even COMSTAR tell us in advance what we can expect in the way of signal level from the birds. Their numbers are not absolute nor always reliable but within a dB or so they are generally quite close. We have published EIRP signal contour footprint maps from time to time in **CSD** although I suspect the newest breed of enthusiasts may not know what we are talking about.

If you know, with reasonable accuracy, what type of signal level (or footprint) you can expect in your area, the system can be designed 'on paper' in advance so you know with perhaps 99% accuracy how it will work before the first bag of concrete is mixed. There are exceptions to this statement of course; for example, outside of the mainland of North America we have a fair number of areas where predicted contours are simply not available; or if available, they fail to take into account the unpredictable 'ridging effects' caused by satellite transmitting

antenna sidelobes.

Jim has always been pretty clever with a calculator and he likes to expand numbers to see, on paper, what a 'model' might do before the real world takes over. He has simply taken the best data for footprints and married that to his carefully measured performance criteria for his various Paraframe antennas. Unlike many of the antennas on the market, Jim Vines knows the gain of a properly assembled and on-site proofed Paraframe antenna to the nearest .1 or .2 dB. That's important to him because when he knows this figure, with accuracy, he can then 'back into' a package consisting of a receiver with a known threshold (such as the Washburn) and an LNA with a known noise figure and tell you just exactly what type of pictures you'll have if you combine the three elements.

I read perhaps 200 letters from **CSD** readers and others each month. Rick Schneringer reads another 5,000 or so each (he sifts out the ones he believes might interest me). A very high percentage of these letters ask the basic question "**What size dish do I need here in Left Overshoe with a 120°LNA and a Super-Whiz receiver to produce noisefree pictures?**". There is no way to answer that question unless you know, with high accuracy, what gain the antenna will have in the field. Very few antenna suppliers tell you the gain they achieve (some do, but they are in the minority or the number is buried in fine print) and having looked at antenna performance in this field for five years now I can assure you that many of the fine print numbers are either dis-honest (on purpose) or wishful thinking. Yet the results you can **expect** in the field are totally dependent upon the gain of the antenna. Nothing else matters if the antenna falls short of the gain in the 'real world'.

Antenna measurement data is very difficult to ascertain. In fact, in another related field (amateur radio) the publication **QST** refuses to accept antenna system advertising which includes antenna gain figures. **QST believes** that even in the HF (high frequency) and VHF frequency range accurate antenna gain tests cannot be done accurately and with repeatable results. If it is this tough at 30 MHz (it is), in many ways it is several times as difficult at 4 GHz.

So I think Jim Vines and Paraframe is on the right track. Yes, Jim quotes gain figures in his advertisements. But he takes it that last important step and tells you what that means; how with the antenna referenced and a receiver of known qualities and an LNA of known qualities you can predict your own performance results.

Since the bottom line in this business is 'sparklies' (or a lack thereof) I believe Jim has made it understandable even to the layman. You don't have to be an expert to look on a map and see what your predicted EIRP's are, then to take that number and select a 'system package' consisting of a certain antenna, receiver and LNA that will perform well in your area. I would like to encourage other suppliers to do the same thing. Here is an opportunity to create a 'standard reference system' which will be meaningful and suitable for direct paper-comparisons between various systems available. It would, if adopted, make your buying process much more meaningful. If your supplier does not offer you this type of calculation ask him why. The only reason I can think of why he might not want to give you the numbers is because he doesn't know the numbers himself. If that is the case, he needs to find out the numbers; soon.

C
S
D
TECHNOLOGY



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WILL 3 METER DISHES WORK AT 3° SPACINGS?

by David Alvarez
MICRODYNE CORP.
Ocala, FL 32672

One of the FCC suggestions for a late 80's orbit belt is that to accomodate more (competitive) satellite systems the present minimum orbital spacings of 4 degrees between (US) bird be reduced to 3 degrees. This suggestion, now being considered but still far from a final decision, has brought howls of anguish from some professional service groups including the influential National Cable Television Association.

Taylor Howard told us in 1978 that ten foot dishes could handle bird to bird spacings as close as 3 degrees. Tests run by Cooper and others in 1978 and 1979 verified the Howard statement.

When SPN (Satellite Program Network) moved to WESTAR III in mid 1980 several hundred (of the larger) cable systems were equipped with ten to 12 foot dishes for the SPN service. This brought out the NCTA engineering department which issued a 'warning' to cable system operators about 'dishes this small'. SPN then engaged consultation to study the problem carefully.

One such study done was prepared by David Alvarez of Microdyne / (AFC). Because of the intense interest in small dish systems we present the Alvarez study here in **CSD**.

The recent utilization of 3.6 and 3 meter antennas for reception of satellite television signals has stirred controversy as to whether or not antennas of this aperture will continue to perform when satellites are spaced 3° in the orbital slot. The purpose of this paper is to bring before the industry the test results and analysis with regard to carrier-to-interference levels produced by adjacent satellites spaced 3°.

It is not within the scope of this paper to determine the minimum carrier-to-noise ratio that a system should operate when using the smaller antennas in conjunction with high level EIRP's available from some domestic satellites. The selection of the appropriate size antennas must be made in accordance with good engineering practices to insure optimum performance.

The purpose of this paper is only to address the case of three satellites with an orbital arc spacing of 3° and the possibility of interference to 3.6 and 3 meter antennas.

TEST SETUP

The antenna mount was modified to accomodate a large protractor which could resolve elevation angle changes within .1°. The 3.6 meter antenna was peaked on WESTAR III and the carrier-to-noise ratio as measured at the receiver IF was 11.7 dB. In this configuration (figure 1) the satellite signal is the desired signal and the RF generator is the interferer.

The antenna was then pointed away from the satellite and the RF generator level was increased to obtain the same carrier-to-noise ratio of 11.7 dB. Thus when the antenna was returned to the satellite the power increase in the IF of 3 dB was obtained. At this point, the interfering carrier is equal to the desired carrier. The generator was then modulated with color bars and with color program material being received from the satellite, the generator level was decreased, then increased until just noticeable distortion was apparent as viewed on the monitor. The difference as read on the attenuator (out of view from the observer and accurate to within .25 of a dB) was recorded as a carrier-to-interference ratio.

In this test, as with all the tests viewed by the first observer, the subsequent observers were called in independently to view the interference free picture, and then were requested to stop the operator of the generator when just noticeable distortion was obtained in the picture.

The worst case number for C to I recorded was 13 dB. The test is now repeated, using the signal generator as the desired signal modulated with color program material and the satellite is used as the interfering source. A transponder on WESTAR III was located modulating with color bars. The system was then recalibrated with a measurement of carrier-to-noise ratio on the transponder with color bars and the generator's output level now set to match the level of the incoming signal. Great care was taken to insure that the antenna was peaked on the satellite and represented the middle of the main beam. The antenna was now moved away from the satellite (greater than 5°) so that an interference-free picture was obtained on the monitor.

The antenna was now moved towards the satellite until just noticeable distortion was obtained in the program material as viewed independently by four observers. The resultant worst case angle measured was 1.6°. It should be noted that this resultant angle did not vary by more than .1° for each of the four observations, and that the observers could not see the antenna or angle indicator.

ANALYSIS OF DATA

First we must determine whether or not the initial number for C to I of 13 dB as measured using the signal generator as the interference source has been duplicated by utilizing the satellite as the interfering source, then relate the angular displacement of the antenna to the satellite in terms of decibels. Referring to figure 3, one can see that the 1.6 degrees (as measured on the 3.6 meter antenna), offset from the center of the main beam yields a number of -12 dB, this number correlates within measurement accuracy to the initial 13 dB, since the signal generator attenuator has an accuracy of .25 dB, and the measurement of the angular displacement of the antenna can be resolved within .1 degrees. **This data now reflects a case whereby two satellites with equal EIRP could be spaced 1.6° apart** - refer to Table 1. The next step is to synthesize the case for **three** satellites with equal EIRP. Since the desired satellite is stationed between the two interfering sources, each interfering satellite will be on **different sides** of main beam. Therefore, the power received from the interfering satellites will be equal, yielding a **3 dB increase** of interfering signal. Again referring to Figure 3, an angle of 1.83° would yield another 3 dB of rejection (-15 dB back down from the peak of the main beam). Case 3 is the same as case 2, but each of the interfering satellites has an EIRP value **5 dB greater than** the desired satellite. Again referring to Figure 3, moving down the amplitude curve **an additional 5 dB** (total 20 dB down from main beam gain), now yields an angular displacement of 2.1°.

In order to correlate this data to a 3 meter antenna, we must now measure and calculate the main beam pattern differential **between** the 3.6 meter antenna **and** a 3 meter antenna, by comparing the "V" pattern of the 3.6 meter antenna, Figure 2, to the "V" pattern of the 10' antenna,

OUR COVER -

Down in Caguas, Puerto Rico Bill Larsen has designed and built this 26 foot Spherical antenna to bring into his home some 50 plus channels of US satellite TV. See 'Correspondence' in this issue's Technical Section.

COOP'S SATELLITE DIGEST

T3-3/81

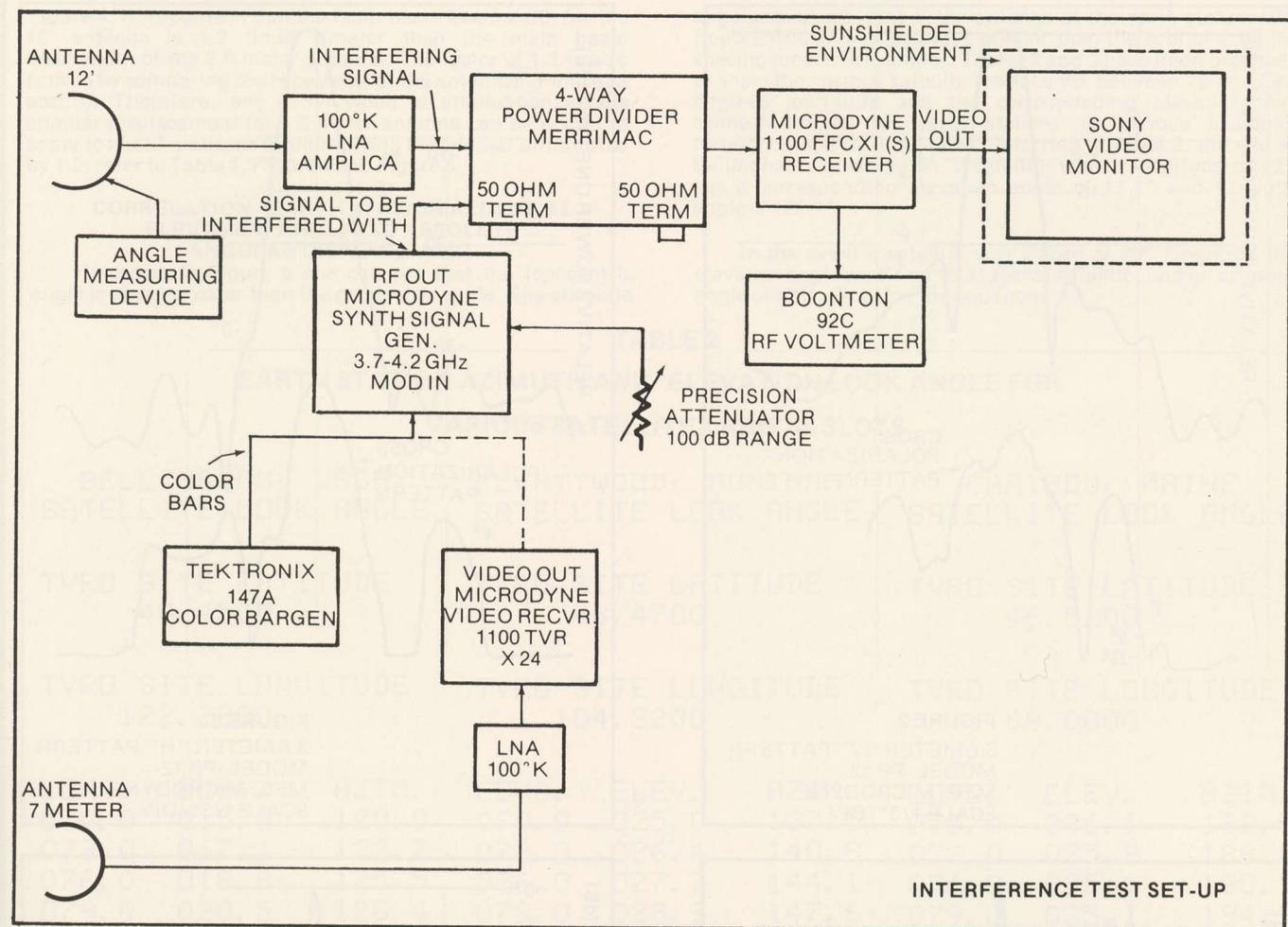


TABLE I

TABULATION OF RESULTS

Various Satellite Configuration vs Minimum Orbital Slot Spacing

CASE I

2 Satellites
Equal EIRP

- ANTENNA SIZE -

CASE II

3 Satellites
Equal EIRP (3 dB worse)

CASE III

3 Satellites
EIRP of each interfering
satellites is 5 dB greater
than desired satellite

(1) Measured

(3) From plot figure 3

(2) From plot figure 5

(4) Corrected by $.1^\circ$ representing orbital drift of the interfering satellites.

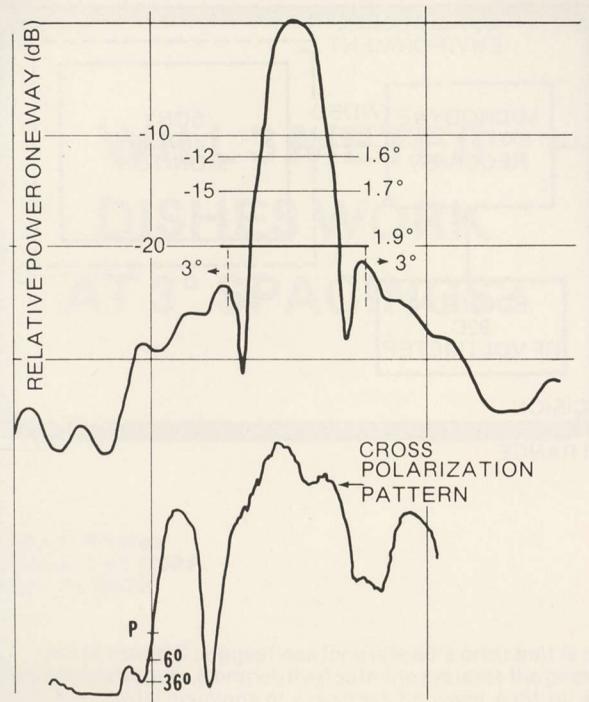


FIGURE 2
3.6 METER 'V' PATTERN
MODEL-PR 12
MFG. MICRODYN
SCALE 1/3°/DIV

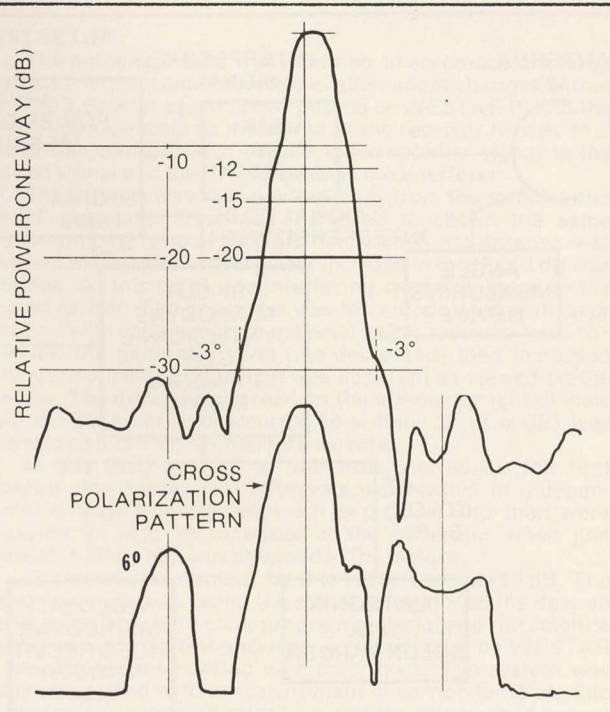


FIGURE 3
3.6 METER 'H' PATTERN
MODEL-PR 12
MFG. MICRODYN
SCALE 1/3°/DIV

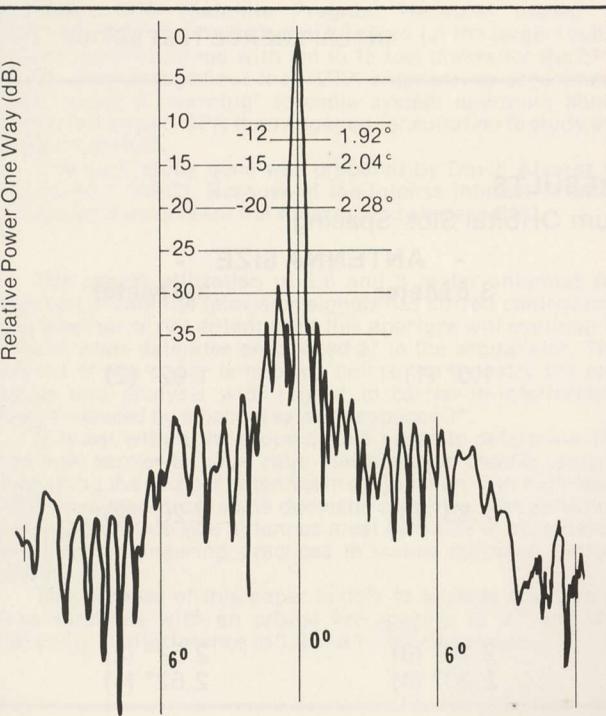


FIGURE 4
3.0 METER 'V' PATTERN
ANTENNA MODEL #135-170
MFG. PRODELIN SCALE 2°/DIV

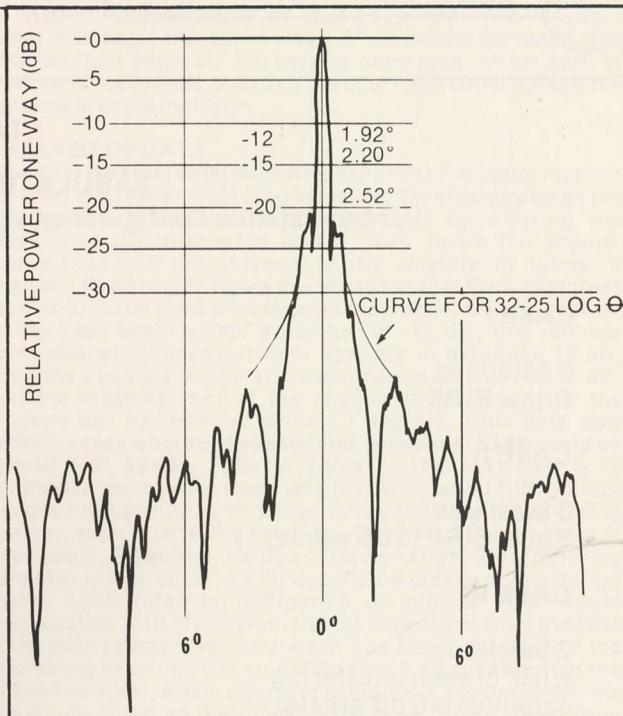


FIGURE 5
3.0 METER 'H' PATTERN
ANTENNA MODEL #135-170
MFG. PRODELIN
SCALE 2°/DIV

Figure 4. It's apparent that the main beam beamwidth for the 10' antenna is 1.2 times greater than the main beam beamwidth of the 3.6 meter antenna. The factor of 1.2 is also proved by comparing the H patterns of the antennas (Figures 3 and 5). Therefore, any given value of attenuation versus angular displacement for 3.6 meter antenna can be scaled to apply to the 10' patterns by multiplying the angular differential by 1.2; refer to Table 1, Figure 4 and Figure 5.

**CORRELATION - EARTH STATION AZIMUTH /
ELEVATION ANGLES TO ABSOLUTE
ANGULAR DISPLACEMENT**

Referring to **Figure 6** one can see that the topocentric angle is always greater than the geocentric angle. The absolute

angular displacement of the antenna at the earth station site (topocentric angle) is always greater than the orbital satellite spacing (geocentric angle). **Tables 2 and 3** have been provided to show the various satellite orbital slots between 70 and 142 degrees longitude and the corresponding elevation and azimuth angles for earth stations in various locations throughout the United States. Referring to **Table 2**, the site of Bellingham, Washington, a satellite with a longitude of 73° has a corresponding elevation angle of 17.1° and azimuth angle of 122.7°.

In the event a satellite was placed at 70° longitude the elevation angle would be 15.3° to that satellite, and an azimuth angle of 120°. By using the equation:

TABLE 2
EARTH STATION AZIMUTH AND ELEVATION LOOK ANGLE FOR
VARIOUS SATELLITE ORBITAL SLOTS

BELLINGHAM, WASH. SATELLITE LOOK ANGLE			PLENTYWOOD, MONTANA SATELLITE LOOK ANGLE			CARIBOU, MAINE SATELLITE LOOK ANGLE		
TVRO SITE LATITUDE	TVRO SITE LATITUDE	TVRO SITE LATITUDE	TVRO SITE LONGITUDE	TVRO SITE LONGITUDE	TVRO SITE LONGITUDE	LONG.	ELEV.	AZIM.
48.4500	48.4700	46.5200	122.2800	104.3200	68.0000	070.0	015.3	120.0
						070.0	025.0	137.5
						073.0	026.4	140.8
						076.0	027.7	144.1
						079.0	028.9	147.6
						082.0	030.0	151.1
						085.0	030.9	154.7
						088.0	031.8	158.5
						091.0	032.5	162.3
						094.0	033.1	166.1
						097.0	033.6	170.0
						100.0	033.9	174.0
						103.0	034.0	178.0
						106.0	034.0	181.9
						109.0	033.9	185.9
						112.0	033.6	189.9
						115.0	033.1	193.8
						118.0	032.5	197.7
						121.0	031.8	201.5
						124.0	031.0	205.2
						127.0	030.0	208.8
						130.0	028.9	212.3
						133.0	027.7	215.8
						136.0	026.4	219.1
						139.0	025.0	222.4
						142.0	023.6	225.5

BELLINGHAM, WASH.

PLENTYWOOD, MONTANA

CARIBOU, MAINE

$$\sqrt{(E_{11} - E_{12})^2 + (Az_1 - Az_2)^2}$$

E_{11} = Elevation Angle for Satellite at 73°

E_{12} = Elevation Angle for Satellite at 70°

Az_1 = Azimuth Angle for Satellite at 73°

Az_2 = Azimuth Angle for Satellite at 70°

$$\sqrt{(17.1 - 15.3)^2 + (122.7 - 120.0)^2}$$

$$\sqrt{(1.8)^2 + (2.7)^2}$$

$$\sqrt{10.53}$$

The total angular difference from the desired to the interfering satellite equals 3.24 degrees. Again this shows that even though the azimuth and elevation angle differential is only 2.7 and 1.8 degrees, respectively the angle subtended is greater than 3°.

CONCLUSION

As a result of the tests performed at Microdyne Corporation on November 25, 1980, we conclude that satellite orbital arc spacing of 3° will not impact either a 3.6 meter or 3 meter system, with regard to carrier-to-interference levels produced by adjacent satellites.

The actual measurement data and application of this data

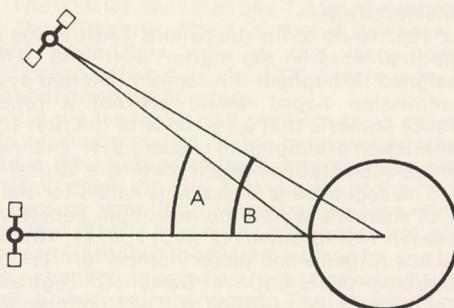
TABLE 3
EARTH STATION AZIMUTH AND ELEVATION LOOK ANGLE FOR
VARIOUS SATELLITE ORBITAL SLOTS

SAN DIEGO CALIFORNIA SATELLITE LOOK ANGLE			BROWNSVILLE, TEXAS SATELLITE LOOK ANGLE			MIAMI, FLORIDA SATELLITE LOOK ANGLE		
TVRO SITE LATITUDE	TVRO SITE LATITUDE	TVRO SITE LATITUDE	TVRO SITE LONGITUDE	TVRO SITE LONGITUDE	TVRO SITE LONGITUDE	LONG.	ELEV.	AZIM.
32.4300	25.5400	25.4700	117.1000	97.3000	80.1100	070.0	027.2	116.6
						073.0	029.6	119.1
						076.0	031.9	121.7
						079.0	034.2	124.5
						082.0	036.5	127.5
						085.0	038.6	130.7
						088.0	040.7	134.1
						091.0	042.7	137.7
						094.0	044.5	141.6
						097.0	046.2	145.8
						100.0	047.7	150.2
						103.0	049.0	155.0
						106.0	050.1	159.9
						109.0	050.9	165.1
						112.0	051.5	170.5
						115.0	051.9	176.0
						118.0	051.9	181.5
						121.0	051.7	187.1
						124.0	051.2	192.5
						127.0	050.5	197.8
						130.0	049.5	202.9
						133.0	048.3	207.7
						136.0	046.9	212.3
						139.0	045.2	216.5
						142.0	043.5	220.6

SAN DIEGO CALIFORNIA

BROWNSVILLE, TEXAS

MIAMI, FLORIDA



A = Topocentric Angle
B = Geocentric Angle

FIGURE 6
Topocentric vs
Geocentric Angles

to antenna patterns has determined the **worst case situation** of 3 satellites occupying orbital incremental spacing of 3° , with the two interfering satellites having a EIRP 5 dB greater than the desired satellite, and allowing for station keeping of $.1^\circ$ produces **no degradation** to the satellite television receive-only terminal utilizing antennas **as small as 3 meters**.

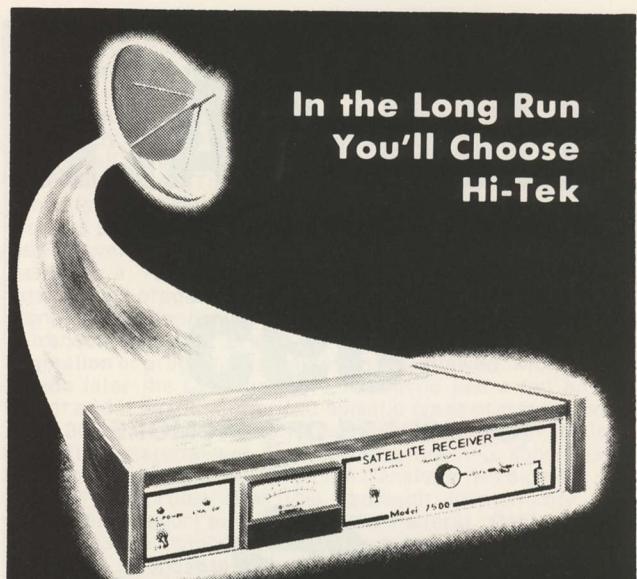
UNDERSTANDING LOW POWER TV ALLOCATIONS

LEGAL FIRST

Careful study of the FCC's Part V 'release' (titled Inquiry Into The Future Role of Low-Power Television Broadcasting and Television Translators in the National Telecommunications System) provides insight into this decision which many believe will continue to dominate the 'news' in the early months of the Reagan administration:

For many years, in fact from the mid-60's onward to recent time, the Commission has taken the stance that 'for the most part the television allocations TABLE adopted in 1952 has worked well and has provided diversified television services to American viewers'. Not all of the public nor all of the Washington system has agreed with the Commission's view.

The pivotal decision made by the Commission came out in 1952. The FCC watched in horror between 1946 and 1948 as the first post-war television stations came on the air. Errors tracing back to late 30's engineering decisions had created a television channel allocations system which when put into practice often failed. In allocating television channels to specific cities the Commission found many of these stations were too close together and interference between stations on the same



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channel, and between stations on adjacent channels, was making a mockery of the concept of quality service. The Commission reacted to growing reports of interference by putting a 'freeze' on all television station approvals in 1948. At the time of the 'freeze' 107 television stations had been authorized to operate. It was not until 1952 that new stations were considered again.

The 1952 re-do of the allocations TABLE was considered to be the final word on the matter. VHF and UHF channels were assigned throughout the country in a new system which the Commission hoped would prevent a repeat of the interference scenario that occurred with the first 107 stations. The Commission attempted to allocate VHF channels to those cities where such stations would cover the largest population centers. The sequence of allocations called for the maximum number of channels where the maximum people were. After placing seven VHF channels (2, 4, 5, 7, 9, 11, 13) in New York City and Los Angeles and lesser number of VHF channels in other population centers such as Boston, Chicago and St. Louis the rest of the country was filled in. The Commission wanted to create a minimum of four TV channels in each of the 'Top 100 Markets'; i.e. those population centers where within 60 to 75 miles of a central point sufficient people lived to make the 100 areas the 100 most populated 'regions' of the country.

Attempts to create a four-channel-minimum using just the VHF channels (2-13) failed. Fortunately tests had been conducted on UHF at about the same period and they indicated that UHF channels (ultimately 14 through 83 and later dropped back to 14 through 69 in most areas) could also provide useful service regions.

The rational for four channels per city was this. At the time NBC was the top TV network, followed by CBS. The third most popular and entrenched network was not ABC but rather the now defunct Dumont Network. ABC was barely more than a glimmer at the time although Dumont and CBS were hardly strong either. The Commission did decide that a fourth channel in each market should be set aside for educational television however. Thus where there were four VHF channels possible (Boston for example with channels 2, 4, 5 and 7), one was assigned on a 'reserved' basis for educational television and the remaining three were set aside for commercial use.

The Commission attempted to serve the most people with VHF, believing itself at the time that UHF was going to be an inferior (or long development period) service. From all of this shuffling and measurements the Commission pronounced an 'Allocations Table' in 1952. The Table has stayed virtually intact until today.

In the intervening years the technology has not stayed as stable as the allocations table. The allocations table did not work as well as the planners had hoped; by concentrating allocations on VHF in metropolitan areas large chunks of the US were unserved. As recently as 1975 a US Senate study revealed more than 1,000,000 US homes were beyond range of even a single TV signal and 6,000,000 (9% of total) homes were beyond the reach of a 'basic' three-channel service. In fact that 1975 study (done by the Denver Research Institute for Senator Howard Baker of Tennessee) indicated that 22,000,000 (34.1% of the then total of US homes) were beyond reach of five channel service.

Cable television and translator systems developed to fill these voids. It should be noted that the above numbers-of-homes-beyond-reach of 1, 3 or 5 stations did include homes served by cable or translators. In other words, those homes found by the Denver Research Institute had no direct reception, no cable service and no translator service. There is one other factor to consider here. DRI made no effort to separate types of service. A home that received three channels in mid-Kansas was counted as a three-channel home even if that service consisted of three NBC stations!

Translators began perhaps as early as 1948. They were called boosters in those days; 'on-channel-boosters' to be precise. A person would climb a hill near his home where he could receive television, install a receiving antenna and connect up a signal amplifier or 'booster'. Then he would connect the output of the amplifier (which normally would connect to the TV set) to a second antenna. The second antenna would be pointed down the hill towards his home. By

amplifying the signal atop the hill and rebroadcasting it down the hill (perhaps only a few hundred feet) he was able to receive television at the base of the hill.

'On-channel' boosters were fraught with problems. The major problem was 'feedback'; the amplified output signal often found its way back into the receiving antenna and a 'loop' occurred. The booster oscillated and TV for some distance was ruined by the hilltop rig. The FCC took a dim view of these installations since they were in fact (very low power) unlicensed broadcasting stations. FCC people were sent into the hills to shut down the boosters.

To cure the feedback loop problem some clever person decided to receive a station in the normal way, **change the channel to a new output channel** and then amplify it for retransmission down the hill. This got rid of the 'loop' but it also then became tempting to increase the 'downlink' power from a nominal .01 or .1 watt to perhaps several watts. The temptation came because the system worked for one house and it could be expanded to cover an area of several houses if the transmitter power was increased. The installations proliferated in the Rocky Mountain states and the FCC spent the better part of ten years trying to stamp them out. Finally in 1960 it said 'uncle' and decided that if these 'boosters' could not be controlled they had to be licensed. The FCC estimated there were "no fewer than 1,000" such 'illegal boosters' operating when the translator rules were established. They allowed the system operators one year to bring their installations up to FCC standards and to obtain licensing. Twenty years later approximately 3,000 of the translator stations are on the books. In its 1980 decision to revisit the translator situation the FCC wrote:

"The decision to propose the inauguration of a new low power television service is motivated, in part, by our recognition of a large, unsatisfied demand for television service. In rural areas, millions of American citizens do not receive even a basic complement of three or four television signals".

Ant then to insure that the new proposed rules do not appear to be strictly a rural ruling, they noted:

"Market studies and economic research continue to suggest that consumer demand for television programming exceeds the supply in many areas of the country. The technology is now available for low power originating stations as well as for their interconnection".

Origination. The FCC was pushed into authorizing translators in 1960 only after a decade spent trying to stamp out boosters proved fruitless. But, in allowing translators in 1960 the FCC very narrowly defined the utility of the translator. It was to be a 'repeater station', receiving via off-air pick up antennas the programs of a single (usually distant) TV station, changing the channel to a new channel (VHF or UHF) and then re-transmitting the programs to a local area. **No local origination or program manipulation was allowed.** More than a decade later the Commission would bend just a tad on this matter and it would authorize specific types of translators to insert 30 seconds per hour of local video/audio when the local origination material was designed specifically to solicit funds for the support and operation of the translator. No big deal.

The new rules alter this approach substantially. The Commission report published in the Federal Register (Vol. 45, No. 203) for October 17, 1980 states in part:

"We...propose to authorized unlimited originations as an inherent feature of the proposed low power television service".

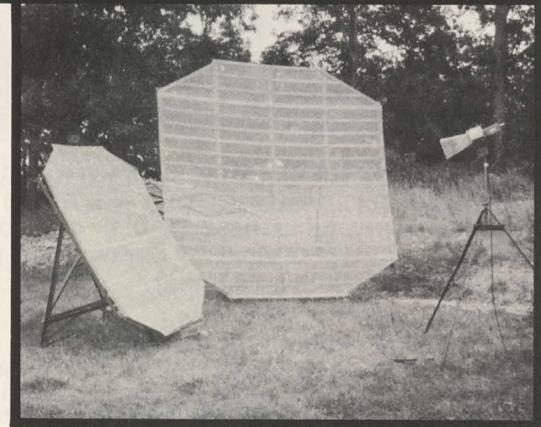
One of the vexing problems associated with translators from the outset has been their financing. Without the ability to 'sell' the product, translator operations have been largely non-commercial. Some are tax-district supported. Others are maintained on a shoe string budget by annual fund raising exercises. Still others are paid for by a citizen who wants television. Commission rules have precluded the translator operator from 'messing' with the signal. He couldn't originate programs, nor could he engage in any type of signal 'alteration' (i.e. scrambling). As the Commission notes in

THE UNBEATABLE PAIR!

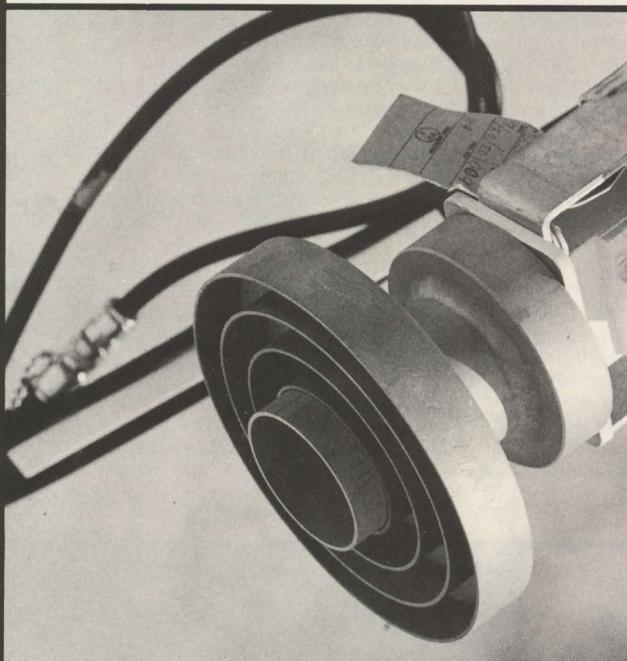
BY NOW virtually everyone knows you have at least two good choices when selecting your satellite TV antenna. The parabolic dish, and, the Spherical. And most people now know that the Spherical offers advantages no parabolic can offer. Such as multiple-satellite visibility, far lower wind resistance (the winds blow through the surface), and not insignificantly lower cost.

THE 8-BALL is the leading antenna line in the Spherical field. Hundreds of 8-Ball antennas are now providing high quality reception from Canada's frozen north deep into Mexico and the Caribbean. Our popular 12 foot size is now joined by a new 8 foot 'demonstrator special' which extensive testing reveals will perform as well as or better than any 10 foot parabolic on the market today! PLUS - with an 8 foot trailer mounted you can demonstrate the length of the full satellite belt (over any 30 degree span) right at your customer's location by simply moving the feed antenna from bird to bird; leaving the Spherical reflector surface 'in place'. BOTH the 8 foot 8-Ball and the 12 foot 8-Ball are now available in the standard mesh and a new 'tough mesh' for extra rugged applications. Pricing remains \$750 for the standard 12', \$780 for the ruggedized version while the new 8 foot is priced at \$650 for the standard mesh and \$685 for the ruggedized version.

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CARE AND FEEDING of your TVRO Antenna is an oft overlooked reason why many small terminal systems have a bad case of the sparklies. The Chaparral Super Feed is the cure to this common ailment.

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examining this twenty year old rule "This precludes the use of scrambled programming to collect subscription fees. (Based upon the record), it appears this ban has retarded the growth of television service, especially in rural areas..."

Subscription TV (STV), or the purposeful scrambling or alternation of the transmissions of a translator "would be an inherent option of the low power television service". In other words, a translator (low power TV) station could scramble all, some or none of its programs as it saw fit. The decision would be in the hands of the translator operator. He could engage in public broadcasting part of his day, advertiser supported television for another part of the day and then scrambled programs for the balance of the day. Or all of the transmissions could be scrambled. The Commission, in revising the rules affecting translator service, notes:

"We believe that translator service, with a free choice for the licensee between a profit-motivated service and a non-profit basis, could result in a totality of service that is more responsive to consumer demands."

The Commission also states that they do not believe there should be rules proscribing how many hours per day of transmission should be free (i.e. non-scrambled), how many hours per day the translator must operate (you will be free to operate for as little time as you wish or for all 24 hours) or how the STV operation must handle its descrambler boxes.

Present FCC rules require that (full power) STV operators **lease** (rather than sell) their decoding or descrambler boxes. The Commission feels that in the case of low power or translator stations this decision should be left to the operator.

NOW TECHNICAL

All translator stations have always been granted on a 'secondary' basis subject to their not creating interference to reception from primary TV broadcast stations. There have been other limitations in the past as well.

1)UHF Markets - in those areas (such as Fresno, Peoria, Scranton, etc.) where the local primary stations are on UHF, VHF translators have in the past been prohibited.

The Commission proposes to do away with this prohibition.

2)Auxiliary - Rules have prevented translators from employing relay facilities on upper UHF and microwave bands set aside for STL (studio-transmitter links, remote pick-ups, etc.)

The Commission proposes to do away with this prohibition.

3)VHF Power - With scant exception, VHF translators have been authorized to operate with one-watt of RF output power in areas east of the Mississippi River and ten watts west of the Mississippi.

The Commission proposes to allow ten watts of transmitter power in **all** segments of the country, subject to the secondary on-interference criteria. In some instances 100 watts of power will be authorized (we'll see where shortly).

4)UHF Power - The Commission presently authorizes UHF translators to operate with powers of 100 watts when the UHF translator is operating on a channel **not** assigned (to the community of operation) in the 1952 Allocations Table. When the UHF translator operates on a table-assigned channel, 1,000 watts power is permitted.

The Commission proposes to authorize a flexible power level for UHF, of up to 1,000 watts, provided the UHF translator (low power) station meets the non-interference criteria.

Of all of the 'initial' steps facing a would-be low power station operator, the selection of a operating frequency (i.e. channel) is the foremost consideration. With the rule changes a great deal of flexibility is possible with the system.

Basically the new station must operate so that it does not interfere with any 'normal' reception from any 'primary service' station. In the VHF band (channels 2-13) there are two criteria to consider. Same (or co) channel stations are the first concern. In the 1952 Table the US was broken into three zones. Primary stations were assigned based upon minimum mileage separations as great as 220 miles (transmitter site to transmitter site). This created in the broadcasting marketplace a rush to build tall towers and to operate with maximum powers

authorized to fill in the often 110 mile radius 'circles'. But with few exceptions signal levels beyond 70 miles preclude consistent high-quality service out to the 110 mile points and co-channel interference begins to be a substantial problem as close as 50 miles from a primary service transmitter.

Attitudes about 'regional coverage' have gradually changed. Even the self-serving broadcaster group AMST (Association of Maximum Service Telecasters) sees the climate for large coverage areas changing. In its decision the Commission quotes the AMST as believing it is 'unreasonable to require a translator to suspend operations because interference is being caused to reception of a primary grade station a very substantial distance'. AMST defines such a distance as 100 miles.

A more realistic approach not discussed in the Commission's proceeding would be to allow low power (translator) stations to operate on the same channel as a primary service transmitter where the translator will be 'beyond the Grade B contour' of the primary station. The Grade B contour is the outer most circle drawn on a map on file with the FCC, as prepared by the primary station engineer. It shows the outer reach of reliable service (typically 70 miles or so). The Commission proposes no minimum mileage separations, aware that each situation may be different. It points out that by utilizing directional antennas (on the low power translator), 'natural terrain shielding' (i.e. an area blocked from direct reception of the primary station by hills or mountains, regardless of distance of the primary station) and other engineering 'tricks' the low power applicant will often be able to find an operating channel where he will cause the interference.

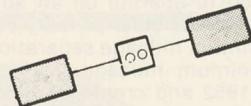
This is of course a two-way street. Anyone entering this field with an eye to providing meaningful service (or coverage) will want to be sure that he does not deliver pictures to his viewers that are degraded by co-channel interference from primary grade stations. One method suggested for this is the low power translator station to employ vertical polarization (all TV transmission in the US employ either horizontal polarization or the newer circular polarization). By being 'cross-polarized' to the primary signals on the channel the translator operator can expect between 22 and 30 dB of 'isolation' from the primary signals. How much is 22 to 30 dB? Well, if you live in a TV fringe area out 60 to 90 miles or so, you seldom have more than a 30 dB (RF) signal to noise ratio present from a primary grade station. You could turn your receiving antenna vertical and lose all of the primary grade station. The dis-advantage to being cross-polarized for your own service would be that your viewers would have to install special (vertical) antennas to receive you.

What about interference between translators? If you are not a primary grade station, you are secondary. Translators are secondary. The Commission reports that through the years virtually all cases of interference between translators have been worked out by the parties involved. **There have been incidents**, even acts of violence, but for the most part the system has worked fairly well. The Commission intends to leave it that way although if your low power (translator) station will be operating on a 'Table Assignment' and there is a dispute concerning interference, you will be accorded some priority over the other station(s).

Which brings us to the matter of operating on a 'Table Assigned Channel'. As you might suspect the 1952 Allocations Table of VHF channels is pretty well filled up by either operating stations or those constructing now. You only find un-used VHF channels in sparsely settled areas or in rare instances in more populated areas where the Commission went overboard in reserving educational channels in 1952. On the chance that you might find such a VHF channel, the Commission proposes to allow you to operate with any power up to 100 watts on such a VHF channel. There is more. The Commission is currently in the midst of revising its minimum mileage criteria for VHF channels, and, when the 1952 Table was prepared not all possible allocations were made. The Commission will allow you to operate with up to 100 watts of transmitter power on a VHF channel if (1) the channel is allocated to the town/city but is unused, or, (2) if you can show that you can 'slide' a new station into that channel at that

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location and still meet the then-applicable minimum mileage separations for co-channel and adjacent channel.

What is adjacent channel? If co-channel is 'same channel', adjacent channel is the channel or channels immediately adjacent in frequency on one or both sides. Channel 2 has only one adjacent channel; 3. Channel 3 has two adjacent channels; 2 and 4. But channels 4 and 5 and 6 have only one adjacent channel since there is a non-TV 'space' between 4 and 5. That is, 3 is adjacent to 4 but 4 is not adjacent to 5. 5 and 6 are adjacent to one another. On VHF it looks like this:

Channel	Adjacent
2	3
3	2,4
4	3
5	6
6	5
7	8
8	7,9
9	8,10
10	9,11
11	10,12
12	11,13
13	12

In specifying the **minimum mileage** between stations on the same channel, the Commission is concerned with **direct interference** between stations. In specifying the minimum mileage between stations on adjacent channels, the Commission is concerned with the inability of the modern television receiver to separate two stations operating on adjacent channel assignments. This has created a 'flip-flop' table of assignments. New York City, for example, is allocated VHF channels 2, 4, 5, 7, 9, 11 and 13. None are adjacent to one another. The next 'market' south is Philadelphia where VHF channels 3, 6 and 10 are allocated. (Around Philadelphia are channels 8 and 12.) Then in the next market south of Philadelphia the assignment flips again as Washington, D.C. -

Baltimore are assigned channels 2, 4, 5, 7, 9, 11, and 13. This sequence repeats itself throughout the populated areas in the east and in major portions of the west. Generally speaking, the FCC will not authorize a station to operate on an adjacent channel closer than 55/70 miles from another primary station. The Commission mixed the minimum mileage separations for co-channel allocations and minimum mileage for adjacent channel operations in a pot in 1952 and created the present 'Table'. Major cities or population centers were not always built precisely 70, 170 or 220 miles apart however so we have some 'breaks' in the pattern where an enterprising chap could slide in a 100 watt VHF channel and still meet the 70/170 or 70/220 (etc.) criteria. One example found in about three minutes time by simply pouring over maps and TV station lists:

Key West, Florida - could be allocated on a 'meet's minimum criteria' standards a 100 watt VHF station on channels 3, 8, (9), and 13; Cuban allocations aside.

The FCC is concerned about both US allocations and neighboring Canada and Mexico allocations by the way; but Cuban allocations apparently are not going to be a problem since Cuba seems to treat international treaties in this area lightly anyhow.

Finding a spot to slide in a new 100 watt VHF station that meets all of the applicable mileage criteria is pretty tough in the eastern USA. Dozens of computer studies have been back and forth over the 1952 Table time and time again as monied investors have looked for a 'hole' to slide in a new station. However, with the new Commission attitude about minimum spacings it might be possible to find ways to use directional transmitting antennas and to show how existing terrain (such as mountains) provides natural shielding for signals that may not meet the mileage criteria established. This will require some study on your part and then a few kilo-bucks in outside consulting engineering to get the matter before the Commission in proper form. It is a challenge but it is also an opportunity.

Out west the distances between major population centers leaves big holes with allocations either open or possible. Unfortunately you may find that where you can fit in a new channel 12 (for example) there is not enough population base to service your debt. That's part of that challenge!

One area where this should not be a problem is in the south-Central San Joaquin Valley of California. From Fresno south to approximately Hanford-Visalia there is an area where VHF channels 2, 4, 5, 7 and 9 could be put into service at the 100 watt power level. In a separate rule making now under consideration the Commission is already aware of this one.

If the 100 watt 'holes' are few and far between in the populated areas, what about UHF? Here is where the real opportunities exist and the Commission, in the September/October ruling/release noted "Although relaxation of the (present) policies in both bands (VHF and UHF) is proposed, we recognize that the development of new service is likely to be concentrated in the UHF band where spectrum is more readily available....".

The Commission's 1952 Table was not nearly as complete at UHF as it was at VHF. Still, it is a finite spectrum and especially in congested eastern areas finding a channel will take some concentrated study. You can do it on your own if you have the background and basic study materials (1) or you can engage a professional frequency search firm such as COMPUCON (Dan Yost at 214/233-4380).

Sliding in ten watt (or lower power) VHF units on a 'non-interference basis' is however something most people can do with just a basic understanding of what to watch out for. Before we see how this works, what can you expect from ten watts?

The present West Indies Video system operates on channel 4 with ten watts of transmitter power down here in the Turks and Caicos. We transmit through a pair of five element

1) If you do not have access to a detailed analysis of the operating US television system, CSD recommends the Television Factbook, a 2450 page reference book from Television Digest, 1836 Jefferson Place NW, Washington, D.C. 20036. Price is \$144 including shipping.

cut-to-channel 75 ohm yagi antennas, arranged so as to 'skew' our transmission pattern in two directions. We are 182 feet above the sea and have a visual horizon of water in a 360 degree arc of about 16 miles. Our measured signal level on a five element receiving yagi 15 feet above ground approximates 1400 microvolts at 4 miles, 800 microvolts at 8 miles and 400 microvolts at 16 miles. The average television receiver will produce a very high quality color signal with inputs as low as 500 microvolts. By installing a more complex transmitting antenna array you can tailor the coverage area to suit your local needs. 75 ohm transmitting yagi antennas are available in MATV lines from Jerrold (TACO), Winegard, Channel Master and others. Technical data sheets detailing antenna stacking and phasing tricks to perfect special coverage patterns are also available from the respective technical departments.

Now let's jump into locating a VHF channel where you can operate. First look around in all directions. Can you find a channel where the nearest co-channel stations are at least 100 miles away? Of course you can. Now look at the adjacents. There is no hard-fast rule on adjacent channel separation for 10 watt translators but common sense should tell you that you don't want to be adjacent to a local station running 100,000 or 316,000 watts when you are running ten watts! They will do you far more harm than you will do them. You'll have to justify your selected channel on the basis of not interfering with the direct off-air reception of a 'primary station' and we suggest the following:

- 1) **Within 40 miles** of an adjacent channel primary station, we suggest you not attempt to put a ten watter on the air. They'll kill you (unless there is a mountain or other heavy terrain to cut down their signal).
- 2) **Between 40 miles and 70 miles** you'll be about as strong in your 10-20 mile across coverage area as the adjacent primary station will be. That means you can live in some harmony most of the time. But, if you do cause them some problems, they'll have the legal right to ask you to cease operation.
- 3) **Beyond 70 miles** you can operate as a 'normally spaced' channel and while you may clobber a primary station (distant) on an adjacent channel they won't have any legal recourse against your operation.

Long Island. Lots of people live there. If you go out from New York City on the island, say 40 miles or more, you could slide in a 10 watter on channel 3 or 6 or 10 or 12.

Miami? Channel 13 would work there. **San Francisco?** Channel 12. **Philadelphia?** Channel 7. **Chicago?** Channel 4. **Dallas?** Channel 2. **Houston?** Channel 5. And so on. You cannot fit in a ten watter in **every** major market but in most you can. UHF is, as noted, a much more open territory. In major cities it will often be possible to install two or more 10 watters on the same VHF channel. Why?

First of all remember the Commission grants you protection against no-one. They will not authorize someone else to build 'on top of you' (if they see the conflict) but you could in a city such as Chicago, for example, carefully combine directional transmitting antennas and transmitting locations so that perhaps as many as 20 or more ten watters could be operated on channel 4 there. Each with a relatively interference free coverage area of 5 mile radius (if circular). There are a lot of people within a ten mile circle in Chicago and the suburbs. Each of these low power stations could adapt to programming which served the people residing there. Each 'ethnic neighborhood' could have, via satellite feeds and local origination, programming tailored to its interests and people. Those are the thoughts and challenges that the FCC's newest 'toy', low power TV, are made from.

THE LICENSING HASSLE

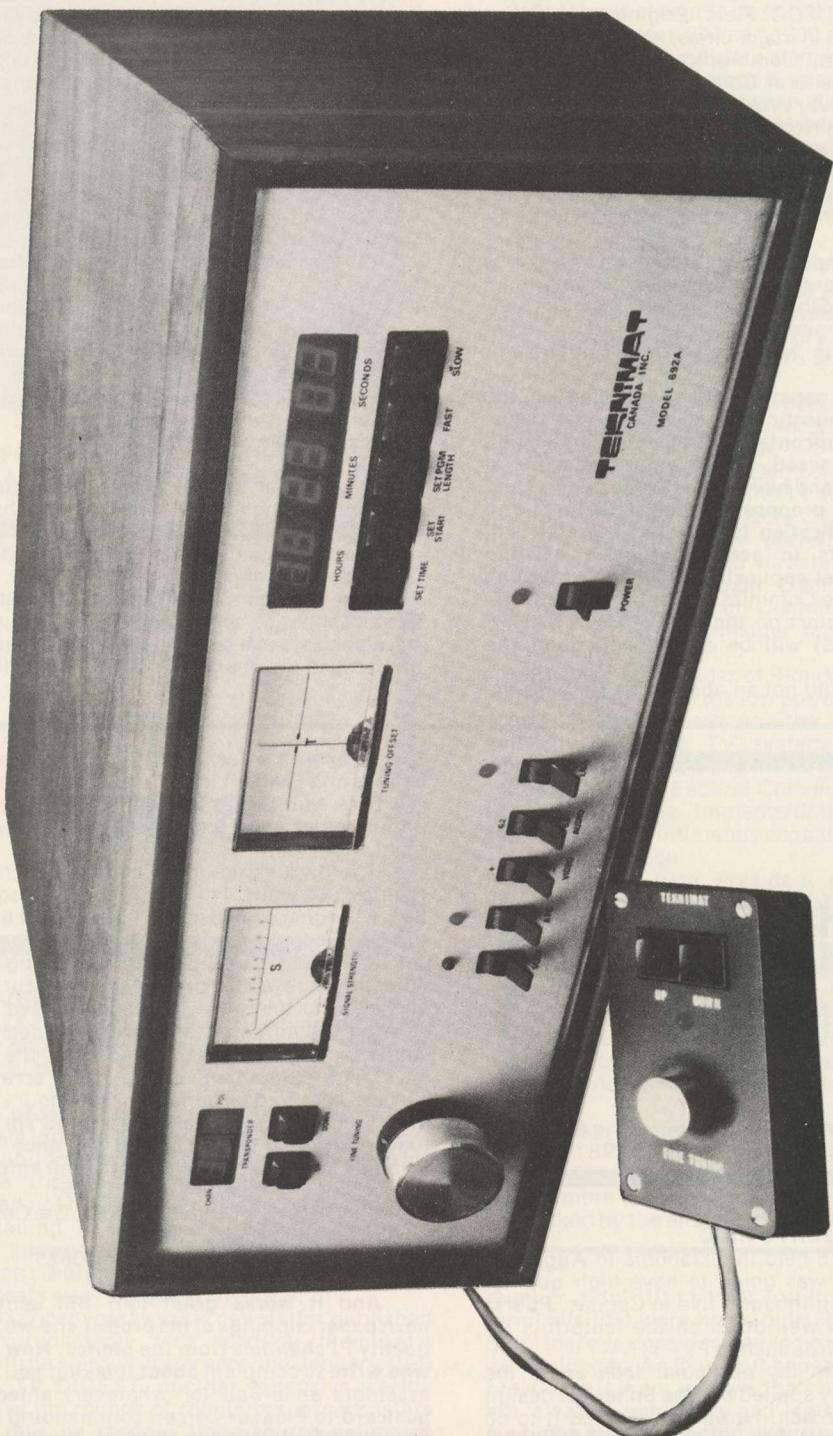
The Commission describes the new service as "...a secondary service designed for maximum flexibility". The licensing game has long been an expensive one. The Commission staff well recognizes that full service (i.e. primary) stations may assume legal fee debt loads beyond \$100,000 just in the licensing process. Clearly, they felt, this type of Washington merry-go-around was not in keeping with the low cost / low power process.

Here is our advice.

- 1) Through your local library or a Washington attorney

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obtain a copy of the Federal Register for October 17, 1980. What you are after is Part V of the Federal Communications Commission 'Inquiry Into the Future Role of Low-Power Television Broadcasting and Television Translators in the National Telecommunications System'.

2) **Contact** the nearest FCC Field Engineering Office (some 24 in all, located in major cities; ask operator for a listing of the Federal Communications Commission office) or write the Federal Communications Commission, 1919 M Street NW, Washington, D.C. 20554. Ask for two copies of Form Number 346; TV translator form. One copy will be your work sheet, the other will be your formal application (with attached copies).

The Commission is preparing a new form specifically for this service but for now they are using the standard TV translator form.

The FCC has done something very interesting with this new service. Formal comments were due to the Commission's record this past February 15th. **The record will remain open until April 1** for 'reply comments'; the opportunity for those who filed by February 15th to 'reply' in writing to others who did so.

But, while all of this paper shuffling is going on the Commission is treating applications filed on a waiver basis. They stated '**The routine, uncontested translator application (should) continue to be processed. We have pursued a liberal policy of waiver in the past, and have no reason to depart from that now, where applicants propose low power features and offer a public interest justification for waiver. The staff will continue...to grant waivers in accordance with existing precedents or will refer novel applications to the Commission for determination**'. But, the Commission cautions those who might want to get a head start on the rush "**ALL GRANTS (adopted on a waiver basis) will be conditioned upon the outcome of the rulemaking...**".

Does that mean you could get an application through the

Commission, and be on the air before the Commission completes the record on this new service? The answer is yes, but with a hitch. That hitch is something called 'mutually exclusive applications'. The Commission has always had a problem when two or more qualified applications arrive for the same channel at the same location. Obviously the Commission must decide **which** of the applicants will get the license. In primary grade situations as many as a dozen applicants have filed for a single channel in the past and some of these took years to work through the Commission. Often several of the stronger applicants will join hands into a single entity to break the log jam.

If you end up being one of two or more applicants for a channel, you will have to wait until after the Commission completes its rule making process. Then a series of hearings will ensue and you'll spend some (possibly real) money wading through hearings and comparisons.

But if you are the **only applicant** for a channel, and the application is in order it goes on a Public Notice at the Commission. If during the PN phase there are no objections filed, you will have your CP (construction permit) in hand in perhaps 4 to 6 months time; a time frame the FCC hopes to materially shorten in the years ahead by streamlining the paperwork process. They had better; within days of the formal announcement of the new service last fall several hundred applications arrived at the Commission.

SUMMARY

The first of the low power applications are now winding their way through the Commission. Perhaps by early summer the first of these new low-cost, low power stations will be on the air. Most will use some or exclusive satellite feeds for their programming connection.

Like the home satellite terminal system which low power broadcast is closely akin to, this is not a mature, fully developed system or technology. And that is why it intrigues us all because the challenges and opportunities are all ahead of us.

Spherical with a focal length of 1.4. It weighs around 5,500 pounds and I can tilt the full reflector surface forward 5 degrees and back as much as 30 degrees so as to be able to keep the radius center point reasonably close to the ground for the feed point antennas.

The back structure is constructed from 1.5 inch square tubing (.062 wall). The next layer is 1" square (.048 wall) and then 5/8 square (.048 wall). The legs are 6" square (1/4" wall) tubing. The surface is #7 galvanized with no open seams. I calculate there to be 8,200 screws holding the screen and 2,000 adjusting screws throughout the back surface to bring the full surface into tolerance. Although I have no real intention of offering the antenna commercially I designed it so that with sub-assemblies two men could erect the full antenna in two days. The adjustment of the 2,000 screws on the reflector surface required around 80 man hours however. I used a 1/16" stainless steel spring wire and spring loaded indicator fixture to adjust the surface to tolerance. It took 11 gallons of Dupont Emeron Epoxy to paint the full antenna!

William H. Larsen
Monarch Tool & Die Corp.
Box 5308
Caguas, P. R. 00625

And it works great too! Bill sent along some local newspaper clippings of his project and we picked out very high quality FI channels from the photos. Now hear this - all of you who write to complain about it taking you a few extra hours to assemble an 8-Ball (or whatever) antenna need to drop a postcard to Pioneer Larsen commanding him on spending 80 hours JUST adjusting the 2,000 screws that it takes to bring his surface into tolerance! There is no 'easy' answer to high quality TV out in the fringes of the boresights - it takes big antenna surfaces, precision designed and precision assembled and twiddled, to do the job. It also takes plenty of patience and dedication - both of which Larsen has. He also mentions that he received help and advice along the way from Cliff Gardiner and Ken Donnelly of Gardiner Communications; help is something

TECHNICAL CORRESPONDENCE AND NOTES

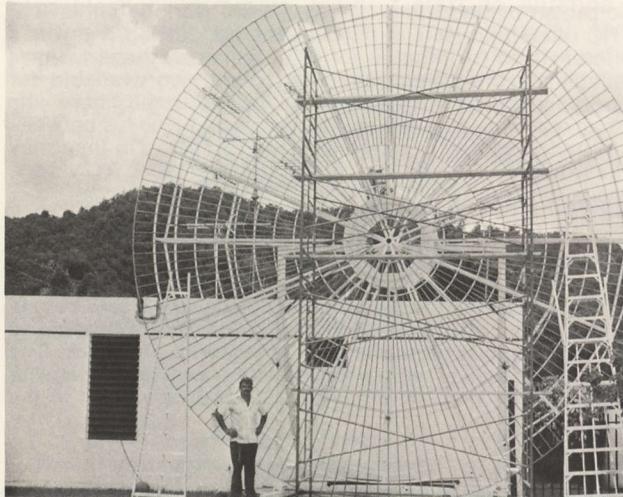
DOING IT RIGHT — IN PUERTO RICO

I attended the first SPTS held in Oklahoma in August of 1979. I decided then that I was going to have high quality, home satellite reception even though I live in Caguas, Puerto Rico which is as most know well down on the footprints for some of the more desirable birds such as F1.

I also decided that from my particular look angle the multiplicity of satellites really spelled out the Spherical design of antenna as the right approach. However I wanted it to do several things which the original Swan antennas did not do. Fortunately my background is with Ford Motor Company where I spent 17 years as a Master Mechanic for the Transmission and Chassis Division and subsequently 10 years as an owner/operator of a tool and die shop here in Puerto Rico. Original training was with the Air Force where I learned how to overhaul radar systems at a school in Mississippi.

My now operational antenna system is an 8 meter (26 foot)

we can all use from time to time.



LARSEN AND 26 FOOTER - Bill Larsen's 26 foot home designed and built 1.4 f/D spherical in Caguas, Puerto Rico.

OUT IN THE OPEN AT SPTS '81

BLOWING OUR COVER?

This April's **SPTS '81** (April 17-19 in Washington, D.C.) may well be the last opportunity for this industry to 'hide' its growth under a bushel basket. We are about to be a victim of our own success.

The cable TV, broadcasting and consumer electronics industries have largely ignored **homesats** (as they call us) up to this point. A recent editorial in a national cable TV magazine told readers that the 'threat' of home satellite terminals (to cable TV services) had not materialized; it pointed out that the much heralded retailing of a \$36,500 Scientific Atlanta terminal by a well known Dallas department store in the Christmas 1979 season resulted in just...one sale. The editorial concluded that homesats were not going anywhere.

An expensive (\$327 per year) weekly newsletter published out of Washington repeatedly tells readers "homesats's (displayed) looked a little sleazy" (reference the January CES show in Las Vegas). **TV DIGEST**, another expensive weekly news letter that makes the rounds of regulators, broadcasters and network execs tells its readers "one source estimates 1,000 home satellite stations will be installed this year..."

Coop recently got into an argument in Washington with an influential person in national communication circles. Coop felt this person, in particular, needed to understand that homesats were (1) not sleazy, (2) not selling poorly, and (3) were considerably more important than a 1,000 terminal per year (1981) industry might otherwise be. "In January 1981 I know

that three of the dozen or so homesat receiver suppliers in this industry collectively turned out more than 1,000 homesat receivers" Coop argued. "That's 12,000 TVRO receivers per year just from three suppliers!" The influential type was not persuaded. "I guess they are sitting on shelves someplace" he replied.

Receivers of course do not sit on shelves. Nor do LNAs (we now judge between 900 and 1200 per month are being shipped into the 'homesat' industry alone). And antennas never sit on shelves (Bob Luly's Umbrella aside)! There are now more than 1,000 Vidiark 8-Ball antennas out there in TV land (and Hayden only started shipping in June) while ADM is popping 50 of their popular 11 footers out the door **each week**.

NO - this is not a 1,000 terminal per year industry. That

SPTS '81 SPEAKER LINE UP

Those attending SPTS '81 in Washington this next month will find a very unusual array of participants in both technical and non-technical sessions. In addition to the talents we will be drawing from within our industry, we are pleased to announce that the following 'names' are scheduled for the program as well:

Ralph Nader - consumer advocate and enthusiast for low power TV (one of his groups recently filed applications for more than 20 LPTV stations).

Honorable Charles Rose, Democrat from North Carolina, a super-supporter of satellite TV services and Chairman of the House Speaker's Advisory Commission on Broadcasting. Congressman Rose played a significant part in getting C-SPAN on the air via satellite.

Congressman Billy Tauzin, Democrat from Louisiana; a member of the House Sub-Committee on communications which is certain to consider legislation in the private terminal area this year.

I. S. Blonder, co-founder of Blonder Tongue Labs and one of the real creators of the low power TV system.

Struki Switzer, perhaps the leading international authority on cable TV system design and a strong advocate of satellite transmissions direct to the home.

Michael Cuzzins, Federal Communications Commission, charged with the implementation of low power TV applications and intimately acquainted with the LPTV and satellite 'inter-face'.

Fritz Attaway, Vice President of the Motion Picture Association of America (MPAA), the movie industry trade group that instigated a hard line on cable TV copyright and who is currently pushing for strict regulation of DBS.

Commissioner James Quello, FCC, an advocate of low power TV and a strong believer in the development of new communications technology.

Parry Teasdale, a 'pioneer' operator of low power TV and the author of the famous 'Teasdale Report' for the FCC, the backbone of the FCC's decision to authorize low power TV.

The April issue of **CSD** will contain a **preliminary** run down on the full SPTS '81 Washington program. This note - response to date has been overwhelming and the Shoreham Hotel reports more than a third of a hotel rooms set aside for SPTS '81 were taken by the end of February!

number didn't fit in 1980 and if you count the early pioneer terminals that were home built, it probably didn't fit in 1979. Still, there is considerable logic to keep this myth going for awhile longer. As long as it appears, because influential trade press says it is so, that we don't amount to much, and that we are 'sleazy', regulators and legislators and broadcasters and everyone else who would like to put the squeeze on this young industry before it really gets going is going to ignore our gatherings and our publications and our progress. The longer we are left alone, to allow technology to do its thing and investor dollars to pour into manufacturing and distributing, the better our foundation and strength to stave off the attacks on our future which are certain to come. The longer we are 'sleazy' and 'under 1,000 terminals per year' in size the longer

HBO and the other unreasonable programming firms (i.e. unreasonable in that they refuse to accept our programming fee payment money which we freely offer) will keep their plans for scrambling on the back burner.

Alas, the Washington, D.C. SPTS this April will force, like it or not, a turn about in the way the communications structure of this country perceives who we are and what we do. Leading the recognition are likely to be influential members of the Washington regulatory and legislative scene; names like Senator Barry Goldwater (for example) have been asked to appear as speakers and panelists at SPTS. The logic behind all of this is simple enough; sooner or later some 'smart' reporter for one of the 'in' trade publications is going to discover that we are moving around 1,000 terminals per month rather than 1,000 per year and from that 'discovery' will come scare headlines that broadcasters and others will rush to their favorite regulator. They will argue that homesats must be regulated and stopped, now, before they become so widespread as to disrupt for all time the 'established' communications system in this country. We of course present no such threat (they said the same thing about radio vis-a-vis newspapers, about TV vis-a-vis radio etc.). But regulators, mindful of where the votes come from and where the funds come from will be receptive to holding hearings and creating a new set of law to define and then squash our innovation.

It is coming and we had better be prepared for it. **That is why** Washington, D.C. is the right place to be this spring. **That is why** we are asking people such as Senator Barry Goldwater to join with us, to speak with us, to tour our ("sleazy") exhibits and to understand just how important this (satellite) communications revolution can and must be for not only America but the world as well.

If you have never attended a SPTS, **attend this one**. This may well be the last opportunity to become a part of the SPTS 'gang' as a 'pioneer'. After this one much of what we all see and appreciate as pioneering in this field may be forced to the sidelines of our industry. If you have been to SPTS (or SBOC) before, **come to this one**. Your experience, your wisdom gained through matriculating through the early years of the industry will be much called for and much needed to help us all develop the proper sense of who we are and where we are going...at this upcoming crossroads for our industry.

TECHNICAL CORRESPONDENCE AND NOTES

WHERE IS NELSON?

I would like to thank those who have purchased copies of the **Nelson Parabolic Antenna Manual** and congratulate those who have built antennas using the Manual. I always enjoy hearing your comments, questions and suggestions for improvement and alternate methods of construction. Many of these comments have found their way into the most recent edition of the Manual now being distributed by STT.

As some of you may know, I have been a part owner of Comm/Plus. Well, I am no longer directly involved with this fine company. I have enjoyed my association with the people here and can say they are first class in all respects and they will look after your interests fairly and honestly. I left with much

remorse but found I simply could not put my heart into the day to day grind of the business world. I am simply not a person who can sit behind a desk all day! I am working on several TVRO related projects of my own and am putting together a 'different kind' of Manual for STT, which we hope to have available by this coming summer. I am also available for consulting work in this field and my fees are small. Those who wish to reach me may call on Thursdays and Fridays between 9AM and 8PM eastern time at (514)276-5541. Or they may write to me at 1189 Van Horne, Montreal, Quebec, H2V 1K1, Canada.

Nelson Ethier
Montreal, Quebec

Nelson is one of those rare individuals who works best in an uncluttered environment where he is left totally alone to bend metal, solder parts and make things with his hands. The Comm/Plus receiver, with which he was associated, is now in production and we plan to have a CSD evaluation of it in the next month or two.

INTERNATIONAL STUFF

Please run an article on different types of feed horns needed to receive international broadcasts and also a detailed breakdown of the meaning of the right hand, left hand, and circular polarization. I also need someone to explain to me spot beam and hemispherical transmissions and to learn where you buy feed horns for these transmissions and the price. I just bought an antenna from Mini-Casat who advertised in CSD and expect delivery in a few days. My LNA is a Dexel 120 degree and the receiver is a Sat-tec. But I do not understand if the Chaparral feed will work for the international broadcasts. Will I need to get a different feedhorn for each different type of polarization? What about using a feedhorn rotator for these transmissions? Finally, please explain how to receive the radio network transmissions. Thanks for getting me 'on line'.

Michael L. Comer
Manassas, VA 22110

Virtually everyone of your questions is handled in "Coop's Satellite Operations Manual". We'll boil it down here. Left hand and right hand polarization are circular. That means the signal transmits from the satellite in a 'corkscrew' fashion, rolling around as it travels through space. It can rotate right to left (left hand circular) or left to right (right hand circular) and to receive the full power of such transmissions you need to adapt your feed to respond to circular rather than 'linear' signals. Adapting the Chaparral feed to this mode was covered on page T9 of the September 1980 CSD. Spot beam means the satellite concentrates its downlink power in a small portion of the earth it can see from space. The geostationary satellite can 'see' or transmit to approximately 40% of the earth's surface below. It can send signal to all of that region or it can use a special transmitting antenna and cut off part of the earth below concentrating signal in a small area; say a single country such as ANIK does for Canada. Hemispheric beams are a cross between spot and full earth coverage; which is called Global beam. Only INTELSAT uses hemispheric (or hemi) beams at the present time; a typical hemi beam will cover 20% of the earth (or 50% of the visible area possible). The INTELSAT IV-4A bird at 24.5 degrees west (nominal location) transmits to Brasil using a hemi beam that can only be seen effectively west of the 24.5 degree location. Any location east, although visible to the bird, receives a very weak (or effectively no) signal. Since you are west of IV-4A you can get the same signal in Virginia that Brasil receives. Rotating a feed for circular polarization is not necessary; the signal rotates itself! Receiving radio networks is a complex subject detailed in past CSDs but also covered in Coop's Manual cited. We recognize that past CSDs are not available to the newcomers and we hope to have an announcement about a solution to this problem next month.

SATELLITE OPERATIONS PARABOLIC ANTENNAS SATELLITE NAVIGATION

SATELLITE OPERATIONS MANUAL by Bob Cooper reveals innermost secrets of satellite operations, who uses them, how and where. ALSO extensive coverage of simple tricks to improve reception, troubleshoot terminals, maintain high performance, locate special services.

NELSON PARABOLIC MANUAL by Nelson Ethier describes theory behind and step by step construction of 10 and 12 foot fiber/metal sandwich high performance TVRO antennas. Literally a manual to start an antenna business in your garage! Includes complete mount, feed instructions.

GIBSON SATELLITE NAVIGATOR - superb treatment of antenna mounts, tracking systems, full understanding of how complex world of geostationary orbit belt can be reduced to simple layman terms. No satellite buff should venture through the skies without it!

- YES - Enter my order for **Coop's Satellite Operations Manual** via first class mail. \$30 (\$35 outside US, Canada, Mexico) enclosed.
- YES - Enter my order for **Nelson Parabolic Antenna Manual** via first class mail. \$30 (\$35 outside of US, Canada, Mexico) enclosed.
- YES - Enter my order for **Gibson Satellite Navigator Manual** via first class mail. \$30 (\$35 outside of US, Canada, Mexico) enclosed.

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SATELLITE BUSINESS MANUAL by Coop provides full business game plan for selling, installing private satellite terminals as a business venture. Includes comprehensive look at most of the equipment now on the market, discusses dealer/supplier relationships.

HOWARD TERMINAL MANUAL - the complete Taylor Howard double conversion 24 channel tuneable receiver, bipolar LNA and feed system in 'do-it-yourself' detail. The Howard receiver is the basis for many of the commercial receivers now available on the market.

WASHBURN RECEIVER MANUAL - High performance receiver for the ultimate in sharp, clear reception with small antennas or in low signal areas. Step by step construction now backed up by parts and kits. Includes remote control package and antenna feed rotation system.

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Three information and equipment filled days starting at 10 AM on April 17th [but we suggest you arrive on April 16th to watch the antenna setting up exercises] and closing at 3 PM on April 19th. As many as 2,000 satellite TV enthusiasts, from would-be dealers and distributors to technology/equipment designers and innovators will be on hand to share and learn all there is to know about low-cost satellite TV terminals! Twin sessions featuring "business opportunities" and "satellite technology" will focus on the important state-of-the-industry today. PLUS - an opportunity to share our technology with important Senators, Congressmen and their Aides. AND - if the lodge at The Shoreham, more than 30 hours of "in-room" satellite TV programming from past SPTS/SBOC events; the history and technology of an industry being born!

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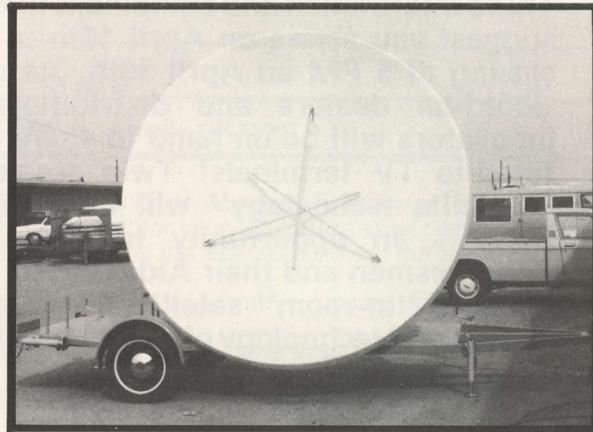
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Get in on the ground floor as a TVRO dealer in your area! Starview Systems provides you with everything you need; professional instruction plus the finest mobile sales terminal on the road today. Included is a 10 foot Starview parabolic equipped with rotating feedhorn, Avantek 120 degree K LNA, top of the line Starview 24 channel tuneable receiver, 75' of coaxial and connection cables plus a trailer to get you to the demo site and operational in 30 minutes time. And the price? An unbelievably low \$6,495!!!



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Dealer discounts are available.

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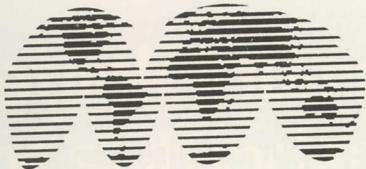
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We know how to advertise, how to generate leads, how to qualify prospects, how to set appointments, how to handle objections (of which there are few!), and how to close the sale!



Advanced Electronics, the Earth Station People, also has a full training program covering all facets of the Earth Station business from lead generation to installation and servicing. This consists of video tapes, printed materials, and live seminars.

We also have a complete engineering department at your disposal to handle any special problems. (We recently completed an installation in Montana where the dish and receiver are 3000 feet away from the home.)

We also feature a fully equipped and staffed service department reachable by our 800-634-6047 toll free number to promptly handle any requirements you may have.

As for advertising, we employ a full service agency to prepare printed materials, direct mail pieces as well as radio, television, billboards, magazines and newspaper ads. They will even place the advertising for your market at no cost to you for their services.

You can see that Advanced Electronics not only offers a turn-key system for the consumer, but also a turn-key system for all of our valued dealers:

1. Warehousing facilities to deliver the entire package from one source,
2. Sales knowledge to impart to dealers,
3. Engineering for any problems you have,
4. Total marketing and advertising programs, and
5. Complete service department.

In short, Advanced Electronics, the Earth Station People, want to help you get started in this very exciting and rewarding business. **THE SKY'S THE LIMIT!!**



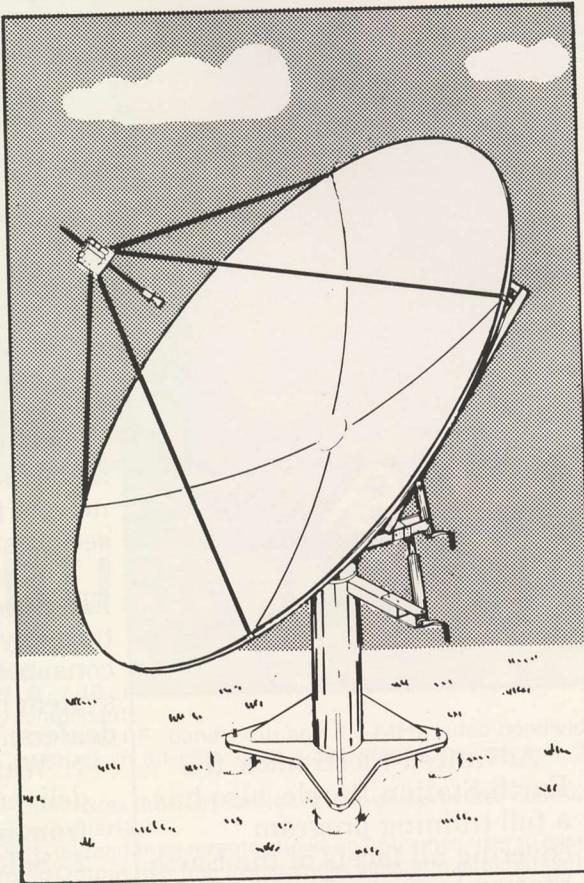
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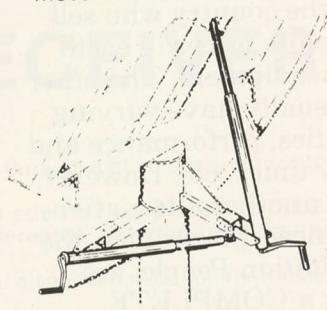
"PARABOLIC DISH"

1. 3.35 MTR (11') Fiber Dish.
2. Optional Expansion to 4 MTR (see option 2)
3. 4 Pc. Construction for easy installation, field handling and lower shipping costs.
4. Accepts standard LNA
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1. Ball bearing race for easy hand turning to change Satellites (see option 1)
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3. Requires only 4 bolts to mount in ground.
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Separate Azimuth/Elevation
Controls for precise adjustment.

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The remote control feature automatically moves the Azimuth and Elevation positions of the antenna to allow the convenience of changing to different satellites without going outside. The control head may be placed on the television or by your favorite chair for arms reach control. A digital readout indicates which satellite the Antenna is turned to. The remote control feature may be added at a later date, even after manual system has been installed.

OPTION 2

If you are in an area where the 3.35 mtr dish offers marginal reception, add the expander kit to give you a full 4 mtr (13') size dish. Easily bolted to outer edge, the fiberglass extension maintains the strength and increases its performance.

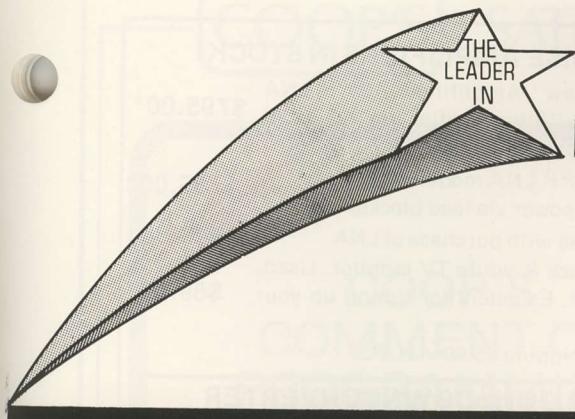
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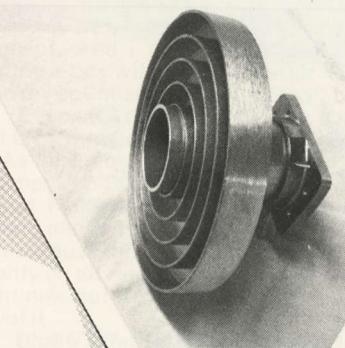


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COOP'S
COMMENT ON
PROGRAMMING

THE EQUIPMENT GAME

I am glad I have nothing whatsoever to do with the manufacture or design of satellite TV hardware. I do not envy those who have chosen this avocation.

These are confusing, frustrating times. The science of microwave equipment design is an art. In spite of the best efforts of innovators like Howard, Coleman, Barker, Freeland, Ramsey et al and our best efforts to explain to you here and in manuals just what is involved in this new field the 'marketplace' for hardware remains largely under-educated and groping for 'truth'. I ceased counting letter stacks some time ago but our mail is probably as good a barometer of what is on people's minds as anything happening these days. Our mail tells me that buyers are confused, often aggravated and occasionally aggrieved. With good cause.

Sifting through the mountains of claims and counter-claims for equipment offered for sale is trying to say the least. I can imagine how exasperating it must be to someone who didn't know what satellites were six months ago. Getting "up to speed" is a painful thing.

The problem of evaluating equipment in the field can be even more awesome. If you happen to get ahold of a particular piece of gear that interests you (with equipment in short supply this is not always done easily) you then run the risk of getting one that has been mis-used or mis-aligned or simply damaged in transit. If you have no real background in this stuff you may write off a particular brand of units for the poor performance of the single unit tested not realizing that a quick, simple internal adjustment would have changed the operation of the unit tested substantially. I recall standing off to the side of a heated debate going on between two dealers at Houston's SBOC. One was arguing that a particular brand of receiver was an excellent performer; he used nothing but that brand having tested several others. The second fellow was retorting that he had tried that particular brand and found it a poor performer. The first chap was incensed because the second dealer was telling him he had made a poor choice in receivers. Neither was giving an inch and the assembled aisle-way crowd of perhaps ten

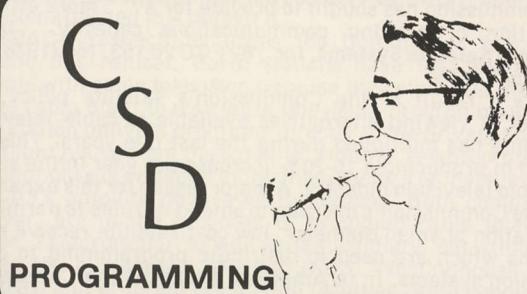
potential dealers were taking it all in. I'd hate to guess how many of those ten eaves-droppers wrote off that particular brand of receiver after that discussion. Fortunately nobody saw me standing there and I was not asked to referee.

"I am totally confused by the equipment" the letter begins. "Please - please [!] just tell me what receiver, LNA and antenna will work best for me here in XXXXXXXX". I think somebody is selling 'form letters'. They arrive by the hundreds every month. They all read alike.

I of course have the same questions. I think the truth falls someplace between knowing exactly what kind of pictures **you** will judge to be acceptable and knowing just how many dollars **you** are willing to spend (whether for your own TVRO system or one that you will package and re-sell). One year ago we were all price conscious. With tongue in cheek I blame H. Paul Shuch for part of this; he was bold enough to proclaim that by mid '80 the industry would have a TVRO receiver for under \$1,000. We did. Two of them in fact. Now we have more than that. My own personal experience with two of these has been covered extensively in CSD this past fall. The ICM 4300... the **particular one** I happen to have... is still the most sensitive receiver on premises. But as a report in February notes, the Washburn Receiver we recently tested is my favorite receiver at the moment. And I rush to the airplane each week hopeful of finding a box with an even better receiver in it because hope (and my optimism) springs eternal.

Even LNAs will surprise you. Way back in 1976 I put in an SCI LNA. I still have it; a 150 degree job. There are three SCI LNAs here now; a 100, a 120 and the original 150. Late last October Bob Behar sent me down a DEXEL 85 degree LNA to try out. He never got it back and I managed to talk him out of a second one at Houston. They are on our 16 foot AFC antenna now because they made a dramatic improvement in our picture quality on all receivers. Maybe there is a better LNA out there right now but if there is, I haven't seen it to test it and write about it.

Right after Houston a new dealer called our Rick Schneringer to ask for help. He had bought a particular antenna at Houston to try out. Everything was new to the dealer and he needed advice. His pictures in West Texas on a 12 footer were terrible. The antenna supplier **told him** it was terrestrial microwave interference. The new dealer wondered if the **4 inch gaps between the panels**, where the antenna was 'out of tolerance', made any difference. The antenna supplier told him he should not be alarmed with a four inch gap. Rick told him to box it up and send it back. Thirty minutes spent with the Nelson Parabolic Manual from STT would have saved the new dealer a lot of grief. Someone new into this field can be pardoned for not understanding the PLL/discriminator debate fine points but there is no excuse for not understanding the premise of dish antennas. My eleven year old, Kevin, wandered around the Houston antenna-parking-lot for ten minutes and spotted two antennas he didn't like. After he told me about them I checked later myself and sure enough the fabricators had made some errors. I spent an hour carefully looking at the rest of the antennas there and only found one more that I didn't care for. The message is really quite simple, read the available literature and apply it or hire Kevin as a consultant!



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SPACE JUMPS ON SHOWTIME

S.P.A.C.E., The Society for Private And Commercial Earth terminals, has begun to make its presence known in the Washington circles of power. SPACE General Counsel, Richard L. Brown, prepared and filed a 'Petition' with the FCC recently seeking the blocking of approval of the Westinghouse take over of the TelePrompTer Corporation. Teleprompter is the world's largest CATV system operator and the acquisition of TPT by Westinghouse represents the largest sale of cable related properties in the history of the cable industry; in excess of \$600,000,000.

TPT owns a 50% interest in SHOWTIME, the satellite programming service, as well as substantial numbers of FCC licenses for microwave systems, cable systems in 458 communities, the national MUZAK background music service and a film production company. Many of TPT's activities are licensed by the FCC and before Westinghouse can purchase the cable firm the FCC must **approve** the transfer of these licenses to Westinghouse.

SPACE's Brown selected the FCC forum for approval of these license transfers to bring to the Commission's attention **SHOWTIME's refusal to sell their FI programming services** to either private home viewer terminals or to apartment/condominium groups not affiliated with existing MDS or cable service firms. Brown and the Directors of SPACE feel that by bringing this private terminal industry problem to the attention of the FCC, in this matter, it may be possible to gain some concessions from reluctant program source suppliers.

CSD publishes the full SPACE 'Petition To Deny Transfer of Control' with only minor editing. Legal references cited may be confusing to the average reader; they 'cite' decisions by the FCC and the courts in other similar situations where the Commission or courts found certain activities illegal. By providing the FCC with these references SPACE in effect 'directs' the Commission to the legal precedents which Brown hopes will ultimately result in the FCC creating a forum that makes it **mandatory** for programmers such as SHOWTIME to make their satellite distributed programming available to private terminal viewers.

PETITION TO DENY

SPACE, (The Society for Private And Commercial Earth stations), pursuant to Section 309 of the Communications Act of 1934, hereby opposes the proposed transfer of control from Teleprompter Corporation (Teleprompter) to Westinghouse Broadcasting Company (Westinghouse) of the certain FCC licenses. Grant of the applications would sanction existing anti-competitive practices, deprive a significant portion of the public of increased television viewing opportunities, and frustrate Commission policies concerning efficient spectrum utilization.

BACKGROUND

SPACE is an association which represents manufacturers, distributors, sales representatives and users of satellite receive earth station equipment. SPACE's opposition to the proposed transfer is based upon the refusal of Showtime, Inc.

[1] to sell its programming to the users of satellite receive earth stations for "backyard" use or commercial (non-CATV) use. [2] **Inter alia**, this refusal is inconsistent with several Commission policies and violates provisions of the Antitrust Laws. If the Commission were to place its imprimatur on this proposed merger, it would sanction conduct harmful to the public while rewarding those who have illegally withheld their product from the American consumer. And, a unique, vertically and horizontally integrated, communications conglomerate, with increased ability and incentive to continue anticompetitive activities, would thus be created.

The cable television industry is increasingly characterized by vertical integration. Teleprompter Corporation is the largest cable television system operator in the United States. It presently serves 1.3 million basic subscribers; 450,000 pay subscribers; and operates in some 458 separate communities. In addition, Teleprompter owns the production company, Filmation and the recorded music supplier, MUZAK. It also owns 50% of the subscription programming company Showtime, which interest was acquired from Viacom, a major broadcast and cable television firm. Showtime supplies programming to 875 cable television affiliates serving a total of 1,500,000 subscribers. Westinghouse Electric, through its Westinghouse Broadcasting Company subsidiary, holds licenses for seven AM, four FM and six television stations. It also owns Group W Productions and interests in several cable television systems, in Florida, Georgia, and New York, with approximately 63,000 subscribers. It has agreed to purchase Home Theater Network, another supplier of programming to the cable industry. The market for the provision of subscription feature film services to cable television operators is extremely concentrated with three program suppliers, each controlled by a major conglomerate (each of which also controls a major cable operator), serving over 95% of the subscribers receiving such subscription service.

COMMISSION'S POLICY

The Communications Act of 1934 (47 U.S.C. 151 et seq) has charged the Commission with making "available so far as possible to all the people of the United States a rapid efficient communications service with adequate facilities at reasonable charges." In short, the Commission is obligated to provide a regulatory environment which promotes the expansion of consumer services to the public. Since 1959 the Commission has met this obligation by introducing competition into theretofore monopolized markets "whenever technological and economic considerations led entrepreneurs to seek to enter." **First Report and Order** in Docket No. 79-272, FCC 80-629, ____ FCC 2d ____, para. 1, released November 28, 1980 (Policy and Rules Concerning Rates for Competitive Common Carrier Services and Facilities).

Implementing this policy with respect to domestic satellites the Commission established an "open sky policy" in Docket No. 16495 which encouraged maximum competitive entry. In re **Domestic Communications Satellite Facilities**, 35 FCC 2d 844 (1972). Its policy with respect to the ground segment — the satellite receive-only earth station — is to maintain a "flexible ground environment" which would as far as practicable "permit a variety of earth station ownership patterns and afford diversified access to space segments..." **Id.** at 855. In adopting its approach to satellite communications the Commission has sought to provide for a "...more efficient utilization of existing communications capacity." In re **Southern Satellite Systems, Inc.**, 62 FCC 2d 153, 159 (1976). **Effect on CATV**

As a result of the Commission's satellite policy, the number of viewing alternatives available to cable television operators has multiplied during the last five years. This has helped in producing a 15-20% increase per year in the size of the cable television industry. A major reason for this expansion was the Commission's decision to amend its rules to permit the installation of small diameter, low cost satellite receive earth stations which are used to distribute programming to cable television systems. In re **American Broadcasting Companies, Inc.**, 62 FCC 2d 901 (1977). As a direct result of that decision, the cost for an earth station for a CATV system has dropped as much as 90% - to as little as \$10,000. The price for such units is

now well within the reach of nearly all cable television operators. This easy economic access to earth stations has produced a rapid expansion of viewing alternatives available to those members of the public fortunate enough to reside in an area served by cable television. The expansion of viewing alternatives available to these subscribers is, as the Commission envisioned, in the public interest.

The Private [Non-CATV] Market

The Commission's decision to encourage low cost receiving facilities had another effect which equally serves the public interest. Only some 20-21% of the public receives cable television service. In many areas not served by cable television, there is, nevertheless, a strong demand for alternatives to the conventional broadcast television programming. Through the use of low cost earth stations purchased by individual members of the public, a growing segment of American homes not served by cable television, is also receiving the educational and entertainment programming available via the U.S. domestic satellites.

The demand for satellite receive earth stations has come from two primary sources. There are many areas throughout the United States which do not and cannot expect to receive multichannel television service anytime in the foreseeable future because of their remote locations. Many individuals in rural areas, and on farms and ranches fall into this category. In addition, there is a growing demand by the residents of apartment houses throughout the United States to receive the educational and entertainment programming available via the domestic satellites. In many areas throughout the country, local entrepreneurs are meeting this demand through the installation of small diameter earth stations. Once it is determined that installation of an earth station is feasible, the entrepreneurs contact the program suppliers (such as Showtime) in order to negotiate a contract to view the company's subscription programming transmitted via satellite to the earth stations. See Affidavit I which is attached.

SHOWTIME'S REACTION TO THE PRIVATE MARKET

Initially it was believed that Showtime, along with the other suppliers of subscription television service, would encourage the development of these new outlets for their product. Indeed, this was the belief of many SPACE members. This was also the belief of a major manufacturer of earth station equipment which established a subsidiary specifically designed to serve these markets. History has proven, however, that this view was naive.³

Rather than increase its revenues with the payments from the non-CATV owners and users of earth stations, Showtime has chosen to withhold its product from such earth station market. It has refused the payments which have been offered. This refusal has hindered the sale of earth stations in many individual cases. See Affidavit I. As a result of such refusals many American consumers are deprived of access, to what is the sole source, for them, of non-commercial entertainment programming. In other areas, where cable television exists or is contemplated, the effect has been to eliminate the only potential source of multichannel service competition to the cable television system.

The only reason offered by Showtime to justify its withholding of programming viewing rights is that the programming suppliers wish only to do business with cable television or multipoint distribution service (MDS) operators. See letter attached to Affidavit II.

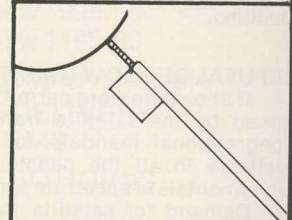
SPACE respectfully urges the Commission to closely examine this refusal. Earth stations have the potential to compete with cable television because they eliminate the need for the cable plant to distribute television programming. The earth station delivers programs directly to the private home or apartment house from the satellite. Neither Teleprompter nor Westinghouse is engaged in the manufacture or installation of non-CATV satellite receive earth stations. Both companies, however, are in the business of providing cable television service. Teleprompter, as well as its subsidiary, Showtime, are both in the business of retailing MDS. Westinghouse owns broadcast and program production facilities. Both conglomerates have the motivation to protect their existing media interests from potential sources of competition which they do

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not control. Should the Commission approve the proposed transfer, the combined entity will have an even greater incentive to withhold its product from earth station users in an effort to stifle competition with its own program distribution facilities.

REFUSAL OF SHOWTIME TO SELL PRODUCT

If Showtime were permitted to arbitrarily limit the market served by the satellite transponder it has purchased, the Congressional mandate to make communications services available to all the people of the United States and the fundamentals of spectrum conservation would be ignored.

Demand for satellite transponder time has become so great that "(t)here is little or no transponder space currently available to the public." **First Report and Order** in FCC Docket No. 79-252, *supra*, at para. 73. This situation will not change in the near future. Because the demand far exceeds supply, existing domestic satellite carriers, if left unregulated, would possess the power to dictate with impunity rates and terms of access. It is precisely because of this fact that the Commission recently decided to maintain broad regulatory authority over such carriers. *Id.* It found that left unregulated these firms would "have the ability to increase price above cost and to allocate transponder space." *Id.* 4]

At issue is the potential for anti-competitive activity and for spectrum misutilization by an entity which has purchased limited transponder time. A satellite resale carrier of entertainment programming such as Southern Satellite Systems, Inc. is obligated to "serve the public...upon reasonable request and without discrimination." *In re Southern Satellite Systems, Inc., supra*. See also Section 201(a) and 201(b) of the Communications Act of 1934 as amended. Because the Commission has recognized that market power is transferred to a domestic resale carrier which has leased transponder space from a satellite owner, it imposed full regulation on resale carriers.

The public policy reasons requiring the regulation of rates, terms and conditions of access to the resale carriers are just as necessary in the case of Showtime. Left unregulated Showtime has every bit as much power and incentive as a resale common carrier to engage in anti-competitive activities. Through its purchase of transponder space, Showtime may, and does, for the benefit of its parents, Teleprompter (Westinghouse proposed) and Viacom, engage in an anti-competitive practice. It denies access to Showtime programs to private earth terminal users, to insulate its cable TV parents from competition.

Showtime may be viewed as operating as a resale carrier. Showtime, as does Southern Satellite, holds itself out to serve the cable industry. Resale carriers "lease channels from underlying carriers and use them to provide service to their customers." *In re Domestic Communication Satellite Facilities, supra*, para. 82. Both Southern Satellites and Showtime lease such time and sell the programming transmitted over the SATCOM common carrier facilities. The Commission has held that an entity which engages in the resale of a common carrier communications service is itself a common carrier. **Report and Order**, in Docket No. 20097 60 FCC 2d 21 (1976). Thus it can be argued that Showtime is a resale common carrier, should file a tariff, and that the tariff must be non-discriminatory, i.e., non-CATV users must be served. See, **National Association of Regulatory Utility Commissioners v. Federal Communications Commission**, 525 F. 2d 630 (1976).

Obviously there are other remedies available in this instance. For example while the Commission has not specifically addressed the issue posed by the anticompetitive denial of access to satellite delivered programming, it has looked at some related situations. In **Microband Corporation of America**, FCC 79-424, Mimeo No. 14263, released July 19, 1979, the Commission, while rejecting a tariff amendment which would have required an MDS customer to serve all members of the public without discrimination, noted that such an amendment could be reasonable "where the customer has an effective monopoly on the use of the service in a given city in critical prime time periods." *Id.* at para. 16. In the case where Teleprompter or Viacom is the cable television franchisee it possesses the monopoly power over multiple

channels of programming. In addition this monopoly exists not just during prime time but twenty four hours per day. The ability and incentive to act anticompetitively are apparent.

Indeed, where Showtime has purchased precious satellite time and denies its programming to satellite earth station users it is, in effect, using the time in "an anticompetitive move to forestall competition." **Metrock Corporation**, 73 FCC 2d 802, para. 5 (1979). Under such circumstances the Commission has an obligation to examine the nature of the offer and the use of limited satellite facilities. It has an obligation to prevent the "...unlawfully discriminatory manner in which these...carriers...have allowed their facilities to be used." **TRT Telecommunications Corp.**, FCC 80-221, Mimeo No. 27288, released May 6, 1980, para. 10. Thus as an alternative to finding Showtime to be a resale common carrier, the Commission could sanction the proposed merger by approving it upon condition that Showtime operate under an RCA tariff requiring satellite service delivery of Showtime programming on a non-discriminatory basis. See **Microband Corporation of America, supra**.

There are significant economics generated by the use of satellites to distribute television programming. And, as noted, transponder space on these satellites is at present virtually non-existent. This confers significant market power upon the existing lessees of transponder space, including Showtime. Showtime's power in this regard amounts to the control of a "bottleneck facility." Control of bottleneck facilities is present when a "firm or group of firms has sufficient command over some essential commodity or facility in its industry or trade to be able to impede new entrants." **First Report and Order** in FCC Docket No. 79-272, *supra*, para. 59. [5] Showtime's power in this respect enables it to impede access of its potential competitors to satellite facilities. More onerous however than this stifling of competition is the fact that Showtime uses its power to deny individual members of the public access to its programming. Where Teleprompter is the cable television franchisee it too possesses control over a bottleneck. This control is being exercised to the detriment of the American public whose spectrum is being used, and it therefore demands immediate regulatory relief. As the Commission has observed: "We treat control of bottleneck facilities as *prima facie* evidence of market power requiring detailed regulatory scrutiny." *Id.* That remedy must include a requirement allowing the purchase of Showtime's satellite programming at marketplace rates. This does not have to be achieved through a tariff process but may be instituted as a condition of the merger.

SHOWTIME'S CONCERTED REFUSAL TO DEAL

The Commission does not adjudicate violations of the Antitrust Laws. However, in evaluating pending matters the Commission must consider whether anticompetitive conduct has occurred as part of its assessment of the public interest. See **National Broadcasting Co. v. U.S.**, 319 US 190, 222-24 (1943); **United States v. Radio Corporation of America**, 358 US 334, 351-52 (1959).

As a general rule, a seller has the right to deal with whomever it desires. A refusal to sell, without more, does not violate the law. **U.S. v. Colgate and Co.**, 250 US 300 (1919). However, there are strict limitations on that rule. The right to refuse to trade was upheld "only in the absence of any purpose to create or maintain a monopoly." *Id.* at 307. See also **Nelson Radio and Supply Co. v. Motorola, Inc.**, 200 F. 2d 911, 914 (1952), **Ace Beer Distrib., Inc. v. Kohn, Inc.**, 318 F. 2d 283 (1963) cert. denied, 375 US 922. It was also upheld in the case of an "entirely private business". *Id.* Even in Colgate there is no indication that business has an unrestricted right to deal with whomever it pleases. See **Six Twenty-Nine Productions, Inc. v. Rollins Telecasting, Inc.**, 365 F. 2d 478 (1966).

Section 1 of the Sherman Act makes unlawful all combinations and conspiracies in restraint of trade in interstate or foreign commerce. If a refusal to deal is in concert with others as part of a conspiracy it is a *per se* violation. **Klors, Inc. v. Broadway-Hale Stores**, 359 US 207 (1959); **Northern Pac. Ry. Co. v. United States**, 356 U.S. 1, 5, 78 S.Ct. 514, 2 L. Ed. 2d 545 (1958); **Fashion Originators' Guild of American Inc. v. Federal Trade Commission**, 312 U.S. 457, (1941); **Eastern Sales Retail Lumber Dealers' Ass'n v. United States**, 234 U.S.

600, (1941). See also **Kiefer-Stewart Co. v. Joseph E. Seagram & Sons**, 340 U.S. 211, 214 (1951); **Times-Picayune Publishing Co. v. United States**, 345 U.S. 594, 625 (1953). Also, if the refusal is in effect an act of monopolization or an attempt to monopolize, it is a violation. **Eastman Kodak v. Southern Photo Materials Co.**, 273 US 359 (1927). An analysis of Showtime's ownership and conduct in light of these criteria indicates that its activities are illegal.^{6]}

As noted, Showtime is owned 50% by Teleprompter and 50% by a subsidiary of Viacom. Showtime's policy is directed by its officers and directors who are appointed by Teleprompter and Viacom. That policy has been, and continues to be, a refusal to sell its product to the non-CATV satellite receive earth station market. This combination and conspiracy has hampered SPACE members and others from entering the business of selling earth stations and has resulted in lessened competition for subscribers in the facilities market for multichannel distribution of satellite programming. By adopting this policy, Showtime protects the cable television systems owned by its corporate parents from the competition afforded by the subscription program reception facilities of earth stations. By acting in concert with management and by directing Showtime's policy, Showtime's corporate parents, as well as Showtime, are engaging in a *per se* illegal concerted refusal to deal. **Associated Press v. United States**, 326 U.S. 1 (1945) **Kiefer-Stuart Co. v. Joseph E. Seagram and Sons, supra**, (1951); **Poller v. Columbia Broadcasting System, Inc.**, 368 U.S. 464 (1962).

The actual effect of this combination is to deny the owners and operators of satellite earth stations the ability to purchase service in the open and competitive marketplace. It also acts to deprive Showtime, itself, of another source of revenue for its products, an obviously destructive goal for a company trying to maximize profits. The only reasonable explanation is that this refusal to deal, while not profit oriented for Showtime, benefits Viacom and Teleprompter. On the other hand, it interferes with the expansion of interstate communication services. In those markets where Teleprompter or Viacom is the cable television franchisee, the combination acts to maintain their monopoly on the provision of both subscription programming and multichannel programming. In those markets where there is no cable television company, it effectively withholds from a large segment of the public the only existing source of multiple channel programming, awaiting the potential arrival of Viacom or Teleprompter. Indeed, the effect of this combination on satellite earth station operators is very similar to that which the Supreme Court reviewed in the **Klors** case. The Court found that:

This combination takes from Klors its freedom to buy appliances in an open competitive market and drives it out of business as a dealer in Defendant's products. It deprives the manufacturers and distributors of their freedom to sell to Klors at the same prices and conditions available to Broadway-Hale, and in some instances, forbids them from selling altogether. It interferes with the natural flow of interstate commerce. It clearly has, by its "value" and "character" a monopolistic tendency. As such it is not to be tolerated. 359 U.S. 213. 7]

The effect of Showtime's action should not be underestimated. By withholding product in each market it is preventing numerous small businesses from providing service to that market. "Monopoly can as surely thrive by the elimination of such small businessmen, one at a time, as it can by driving them out in large groups." *Id.* In recognition of this fact, "the Sherman Act has consistently been read to forbid all contracts and combinations when 'tend to create a monopoly' whether the 'tendency is a creeping one' or one that proceeds 'at full gallop'." **International Salt Company v. U.S.**, 332 U.S. 392, 396. *Id.* at 213-214.

Finally, Showtime's refusal to deal cannot be justified as a business decision designed to maximize the revenues of itself or its corporate parents. Nor may it be justified as required to preserve its methods of distribution. As the Supreme Court observed in **United States v. General Motors**, 384 U.S. 127, 146-147 (1959)

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470 560 680 820 1000 1200 1800 3900 8200	\$.60

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RCA 40673	\$ 1.50
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SMA PLUG FOR RG-174	\$ 6.57	
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combination or conspiracy is so inconsistent with the free-market principles embodied in the Sherman Act that it is not to be saved by reference to the need for preserving the collaborators' profit margins or their system for distributing automobiles, any more than by reference to the allegedly tortious conduct against which a combination or conspiracy may be directed...

Because of the above described *per se* illegal activities of Showtime, it would be inconsistent with the public interest to grant the proposed merger.

SHOWTIME VIOLATES THE SHERMAN ACT

Activities of Showtime, if not corrected also violate Section II of the Sherman Act. This Section prohibits monopolization, attempts to monopolize and conspiracies to monopolize. Here, the vertical integration of Viacom/Teleprompter and Showtime, in connection with the oligopoly of subscription program suppliers, via satellite, must be viewed, in and of itself, as suspect. The simple fact is that there exists an oligopoly of feature film distributors (including Showtime) commonly owned with major cable systems. The refusal to deal of the film distributors serves to create or enhance the monopolies of these cable systems.

Where Teleprompter owns the cable system in a community and access to Showtime's programming is denied to the owners or users of earth stations, Teleprompter perpetuates its monopoly control over multichannel facilities in the community. Where Teleprompter is a potential cable operator, Showtime's refusal to deal with private earth station users serves to make the market better for the introduction of cable (no competition). Showtime's oligopoly power is being used to promote Teleprompter's cable interests.

These points may be illustrated by a prior suit which was brought against Westinghouse. Plaintiff alleged that Westinghouse, which is in the program production business, refused to air programs on its television station produced by plaintiff. In reversing the District Court's dismissal the Third Circuit stated:

"The only other point that requires discussion is whether the admitted fact that Westinghouse enjoyed a lawful monopoly of telecasting refutes or negates the charge that its power as telecaster has been used to create a monopoly in violation of the antitrust laws. In numbers of situations the existence of lawful monopoly powers has failed to protect the monopolist in some related but additional restraint of trade.** In *United States v. Griffith*, 334 U.S. 100, 68 S.Ct. 941, 92 L.Ed. 1236 (1948), the Court made this observation: 'A man with a monopoly of theatres in any one town commands the entrance for all films into that area. If he uses that strategic position to acquire exclusive privileges in a city where he has competitors, he is employing his monopoly power as a trade weapon against his competitors. ... This is...a misuse of monopoly power under the Sherman Act. If monopoly power can be used to beget monopoly, the Act becomes a feeble instrument indeed.' 334 U.S. at 107, 108, 68 S.Ct. at page 945. 255 F. 2d at 710."

Just as Westinghouse could not use its legal monopoly power to create a monopoly in a separate but related field, Teleprompter cannot use its cable television monopoly or Showtime its transponder oligopoly to obtain a monopoly over subscription program services and multichannel reception facilities in a given community. See *Six Twenty-Nine Productions, Inc. v. Rollins Telecasting, Inc.*, 365 F. 2d 478 (1966).

Showtime's ability to restrict competition appears to have been forecast by the Commission's Network Inquiry Staff. Recently, the Staff pointed out two anticompetitive results associated with vertical integration.

"First, existing networks may seek to deter new networks by obtaining, through ownership or contract provisions, an exclusive right to serve local outlets." 8]

It went on to point out that competition may be limited in this matter only when the number of outlets "cannot be

expanded rapidly." *Id.* Because neither the number of transponders nor cable systems in a community is likely to expand rapidly Showtime's refusal to deal acts to prevent the formation of competitive entrants. If Westinghouse, itself a program supplier, asserts its control over Showtime, and is not deterred by Commission action now, these problems can only be compounded.

The second activity the staff warned against was that:

"If some firms are permitted to acquire a monopoly of local outlets they may purchase or affiliate exclusively with, only one or a limited number of networks will develop in order to exploit that monopoly power."

Again, Showtime's control over limited satellite facilities and its refusal to deal combined with Teleprompter's cable television monopoly in 458 communities achieves the same adverse consequences warned against by the Staff. As a remedy for these problems, the Staff has recommended the imposition of access requirements. SPACE strongly supports such a right of access to Showtime's programming, indeed as shown herein the public interest requires it.

COMMISSION POWER

SPACE believes that the Commission possesses the authority to prevent the abuses which have occurred. This may be accomplished by denying Teleprompter's requests for license transfers of control to Westinghouse and by initiating an Inquiry into Showtime's, Teleprompter's and Viacom's anticompetitive practices. Alternatively, the Commission could defer action on the transfers of control pending the outcome of its investigation into these practices. However, far more effective would be Commission adoption of a clear requirement authorizing access to satellite distributed programming at marketplace prices. 9] Whatever method is chosen, it is clear that the Commission has an obligation to fully address the anticompetitive conduct engaged in by Teleprompter in concert with Viacom and Showtime.

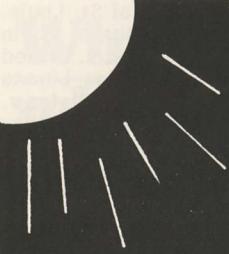
The Commission possesses ample authority to fashion appropriate relief for the abuses resulting from Showtime's behavior. The Commission has "broad discretion in choosing how to regulate." *AT&T v. FCC*, 572 F. 2d at 26. As the Supreme Court has long recognized, the changing nature of the communications industry requires "that the administrative process possess sufficient flexibility to adjust itself to these factors." *FCC v. Pottsville Broadcasting Co.*, 309 U.S. 134, 138 (1940). See also, *United States v. Southwestern Cable Co.*, 392 U.S. 157 (1968); and *National Broadcasting Co. v. United States*, 319 U.S. 1980 (1943).

In the case of satellite communications, the Commission specifically recognized that:

"Some departures from conventional standards may be required if the public is to realize the potential benefits of this high capacity technology and we are to pursue our objective of competitive entry." 35 FCC 2d 849.

Indeed, "regulatory practices and policies that will serve the public interest today may be quite different from those that were adequate for that purpose in...earlier times..." *Washington Utilities & Transportation Comm. v. FCC*, 512 F. 2d at 1157, and thus, "one of the most significant advantages of the administrative process is its ability to adapt itself to new circumstances in a flexible manner..." *FCC v. National Citizens Committee for Broadcasting*, 436 U.S. 775, 811 (1978). While the Commission's historic policy towards satellite communications has served the public well, present refinements to that policy are required to insure that it continues to do so.

One critical refinement is a requirement of access to Showtime's programming at marketplace rates. Because of the limited existing transponder capacity as well as the Commission's interest in promoting competition in the telecommunications market such a requirement is essential to safeguard the public interest. The furtherance of full, fair and open competition is an essential element in weighing the public interest associated with the proposed transfer of control to the above-captioned applicants. See, e.g., *FCC v. RCA Communications, Inc.*, 346 U.S. 86 (1953); *Specialized*



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Common Carrier Services, 29 FCC 2d 870 (1971), recon. 31 FCC 2d 1106 (1971), aff'd sub nom.; **Washington Utilities and Transportation Commission v. FCC**, 512 F. 2d 1142 (9th Cir.), cert. denied, 423 U.S. 836 (1975); **Bell Telephone Company of Pennsylvania v. FCC**, 503 F. 2d 1250 (3d Cir. 1974), cert. denied, 411 U.S. 1026 (1975); **NARUC v. FCC**, 525 F. 2d 630, 640 (D.C. Cir. 1976), cert. denied, 425 U.S. 992 (1977); **United States v. FCC**, No. 77-1249 (D.C. Cir. March 7, 1980).

For the foregoing reasons SPACE respectfully requests that the Commission deny Teleprompter's requested transfer of control; or in the alternative specifically condition the transfers on a guaranteed right of access of non-CATV earth station operators and users to Showtime's domestic satellite programming at marketplace rates. Another option would be to conduct a hearing to determine, in light of the foregoing, whether the proposed transfers would be in the public interest.

Attached to the SPACE petition were two documents; one an affidavit prepared by **Frank C. Accardo** (President of Frank's TV Antenna Service, Lomita, CA). In his affidavit Accardo stated that his firm had sought a contract from SHOWTIME to use SHOWTIME programming for his private terminal system customers. SHOWTIME refused to grant a contract to Accardo (as they have consistently done for all other private terminal users and sellers). The second document was a letter to Empire Antenna of San Diego, CA from Richard J. Sullivan, VP at SHOWTIME. The letter noted the interest of Empire to handle SHOWTIME programming to its customers but stated "...It is the policy of SHOWTIME to provide our service exclusively to licensed cable and MDS operators only. Should this policy change in the future, we would be pleased to talk with you..."

Changing the policy, and now is as good a time as any, is what the whole program is about. Do you support SPACE? It is working for you daily!

FOOTNOTES

1] Showtime is owned 50% by Teleprompter and 50% by Viacom International, Inc. (Viacom). It is one of three major suppliers of feature film subscription programming without commercials to the cable television industry. All three such suppliers (Home Box Office, Showtime and The Movie Channel) are owned by major communications conglomerates which also own three major cable companies in the United States (Teleprompter Corporation, American Television and Communications Corporation, and Warner Amex Cable Communications, Inc.). All three suppliers have adopted restrictions on the sale of their programming to users of satellite receive earth stations, with The Movie Channel being the only supplier indicating a willingness to sell its product in some cases.

2] The "backyard" user typically installs a receive-only earth station for private, non-commercial use in his or her backyard. The commercial use of such earth stations typically involves installation at an apartment house where individual tenants or condominium owners are charged for service. In this Petition reference to earth station owners or users refers to either or both these modes of operation.

3] Teleprompter would appear to desire that this myth continue. The Commission is told, for example, that if approval of the merger is granted, effective competition to HBO will be established and "...the public will gain another alternative to the three national television networks as a source of programming..." Application CAR 15535-09, Exhibit B-6, p.9. If Teleprompter truly desires that Showtime expand its service, it would not prevent Showtime from selling its service to those who are willing and able to pay for it?

4] In a **Second Memorandum, Opinion and Further Notice of Proposed Rulemaking** in FCC Docket No. 79-252, the full text of which has not been released, some changes to the policies announced less than one month ago appear to be contemplated. See Action in Docket Case Report No. 16104 released December 16, 1980. SPACE will file its comments in response to that Further Notice at the appropriate time.

5] See **United States v. Terminal Railroad Ass'n of St. Louis**, 224 U.S. 383 (1912); **Eastman Kodak v. Southern Photo Materials Co.**, 273 U.S. 359 (1927); **Associated Press v. United States**, 326 U.S. 1 (1945); **United States v. Klearflex Linene Looms, Inc.**, 63 F. Supp. 32 (D. Minn. 1945); **United States v. Lorain Journal Co.**, 342 U.S. 143 (1951); **Gamco v. Providence Fruit and Produce Building**, 194 F. 2d 484 (1st Cir.), cert. denied, 344 U.S. 817 (1952); **Times Picayune Co. v. United States**, 345 U.S. 594 (1953); **Otter Tail Power Co. v. United States**, 410 U.S. 366 (1973).

6] By the joint control over Showtime, the combination between Teleprompter and Viacom governing Showtime's conduct brings the action of Showtime within the confines of Section I. There is also an "intracorporate combination of conspiracy" between Showtime and Teleprompter. See **Kiefer-Stewart Co. v. Joseph E. Seagram & Sons, supra**.

7] Even if it could be demonstrated that Showtime is acting alone and not in concert with one or both of its corporate parents, such action could be nevertheless deemed a violation of Section I of the Sherman Act. **Flintkote Company v. Lysfjord**, 246 F. 2d 368, 377.

8] **New Television Networks: Entry Jurisdiction, Ownership and Regulation**; Final Report, Network Inquiry Special Staff, October 1980, p. 16.

9] The marketplace price is the price charged cable operators on a per subscriber basis.

WEST INDIES VIDEO REPORT (Part V)

TRADING SAND FOR SAW DUST

One of the misfortunes of creating a publication such as this each month is that you work to a deadline. Since I started in the publishing business in 1959 I have never missed a publishing deadline. That is something like 250 monthly issues of one or another magazine I've been responsible for through the years.

When you work to a deadline you often find yourself writing today about something you expect to happen tomorrow. "Expect" is the key word here. Naturally since you are writing about it before it happens but also after the fact (i.e. the publication will come out after it happens) you have to make an assumption or two about the way things may turn out; and then write that is how they did turn out. Sometimes you goof.

If you go back to the February CSD and pick up on where we were with West Indies Video at the first of February (which was really the middle of January if you follow me) you'll see what I mean with what follows.

I headed for Oklahoma in mid-January to get the February issue of the Digest out, and to also make a stop at Old Bridge, NJ and Washington, DC on the way back to the Turks and Caicos. More about the Old Bridge stop shortly. When I left T & C eleven year old Kevin was left in charge of keeping WIV on

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V811	3.0-3.5	0 to 12
V812	0.9-1.6	0 to 60
V813	0.9-0.95	0 to 20
V814	2.7-3.2	0 to 20
V815	2.7-3.7	0 to 60
V818	2.8-3.4	0 to 18
V907	3.6-4.2	0 to 15
V908	4.5-5.1	0 to 20

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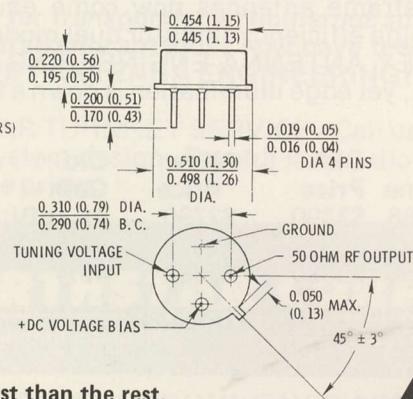


"Coop's Satellite Digest" of July 1980 says that Watkins-Johnson's VCO's have a lower set of FM sideband noise figures than the competitor's published specifications (FM sideband noise is unwanted noise that comes out of the oscillator and can, in severe cases, degrade the performance of the receiver noise figure). In addition to good FM noise performance, delivery is also good. One example is SATEC's experience in getting an adequate supply of the "hard to procure" high LO.

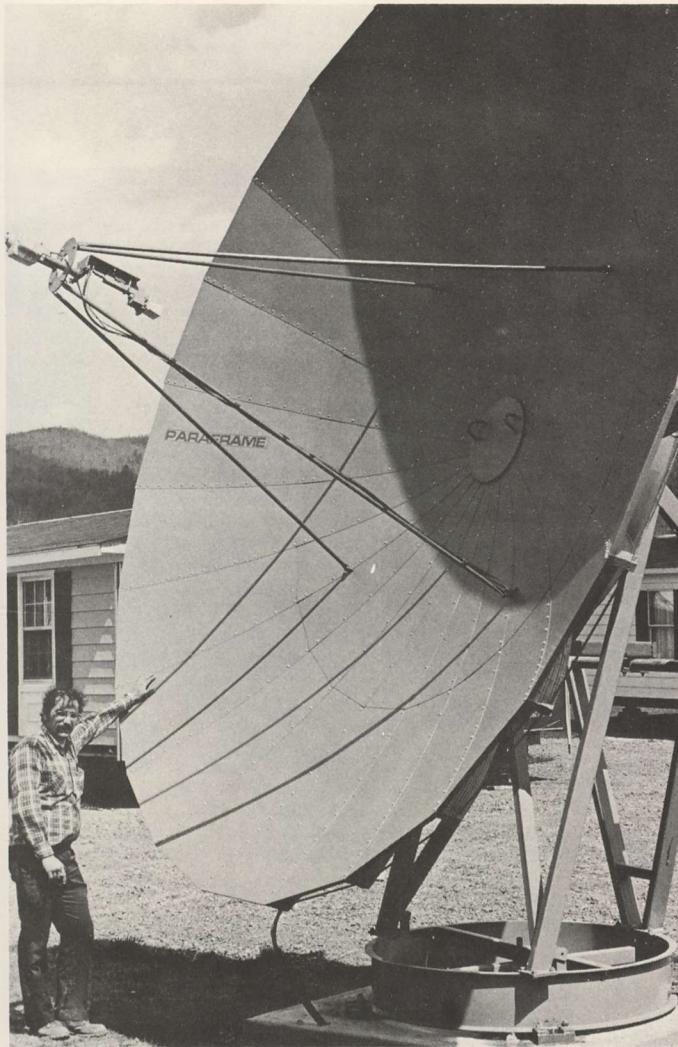
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ET/6.00	26.1	24.9

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COOP'S SATELLITE DIGEST

P11-3/81

the air. I took him aside and told him the whole country was depending upon him for TV while I was gone. Then he and I headed to 'the hill' (our Blue Mountain transmitter site) for a last check on the transmitter. We had been feeding signal 'up the hill' on our STL frequency of channel 7 for several weeks at that point. By flipping our STL antennas over to vertical and phasing two stacked ten element yagis on the receive end so that a Dominican Republic channel 7 (horizontally polarized) was in a 'null' we had had excellent results with the 4+ mile haul and 1 watt of transmitter power. I know you can't (legally) use VHF TV channels for STL purposes in the states but if you are reading this outside of the states where you could do such a thing, I recommend it. We take our baseband video and audio and feed them into a Blonder Tongue TVM channel 7 modulator. The TVM is a pretty professional piece of gear and we had used it in our Arcadia, Oklahoma home for our MATV system for two years before we got here. I figured since we never had a lick of trouble with it there we could count on it here as well. So far so good. Then out of the TVM we feed around +42 dBmV into an Anderson Scientific 1 watt peak pedestal power amplifier. That's our STL transmitter and we arrive at 'the hill' with around 800 microvolts of signal 4.5 or so miles away. At 'the hill' of course we come in on channel 7 and go back out to the island's TV sets on channel 4.

I finally figured out why the solar cell powering system recommended by a Maryland firm cost so much; they were packing in sufficient collector surface area so that in one day of sunlight (winter day which they figured 70% illumination here for 8 hours) we were collecting enough 12 volt amperage to power our 10 watt translator for nearly 5 days (120 hours). Like everyone in that business, they are frightfully conservative and were sand bagging the system for the worst of the worst. Once I figured that out I had a solution to the price they wanted. They supply me with enough DC 12 volt amps in an 8 hour, 70% sunlight, winter day for one day and I'd provide a pair of extra auto batteries charged on regular household current 12 volt supplies to act as the standby system. This immediately brought the price down by 70% and we are now awaiting delivery of the first solar array.

We started out hauling a freshly charged auto battery up to the hill every 72 hours (3 days). It takes almost exactly 72 hours for the ten watt translator-transmitter to drop a nominally fully charged heavy duty auto battery from perhaps 13.3 or so volts no load to say 11.3 volts loaded. And that's with 24 hour per day use. Then we switched to placing three 12 volt batteries in parallel so we had 9 days between visits to the hill. I like the hill (see next page this month) but visiting it every three days is king of a drag.

With the solar cell array we'll visit the hill perhaps once a month. During the summer months we have more than 8 hours of 70% sunlight so we'll charge enough with the array to make up what we need for the next 24 hours plus have some left over to keep a pair of standby batteries charged to full tilt for those very occasional days when the sun does not shine. The monthly visit will (I hope) be for peace of mind more than any real need to change something.

"These are three freshly charged batteries" I explained to Kevin. "I plan to be back a week from today but if I get delayed you will have to change them out with a fresh set". He explained back to me how he would do that and we popped open the door on our hilltop container to check on the indicated output power. 8.5 watts on the nose; right where we run it. On the way to Provo's air strip where I was going to catch a ride to Florida with Ed Hegner he and I checked out what he would do in the event of an emergency.

"If you lose your signal coming back down on channel 4???" I asked? "Switch to our pick up antenna for the ATL link to see if we are feeding channel 7 to the hill" he replied. "And if you are?" I asked. "Get Mom to drive me up to the hill so I can check the input to the translator to see if it is getting the channel 7 STL" he replied. "And if it is?" I asked again. "Check to see that we have battery power to the translator" he replied. Comfortable that this small country would have its TV service in good hands, even if they were 11 year old hands, I boarded Hegner's two engine Beech. 'How many TV stations are run totally by an 11 year old youngster' I mused to myself

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while Hegner was loading two passengers and dozens of boxes around my tired body. I chose to ride the rear bench seat planning to catch a three hour 'cat nap'. I could barely see Hegner and the two front seat passengers through the pile of boxes in front of me. I fell asleep before we cleared Provo. About thirty minutes later I awoke. Icicles were dripping from my face. My feet felt as if I had frost bite. I was sure I was dreaming. Down below I could see the southern Bahamas.

One of this winter's worst wintry blasts had just ripped through Florida. Later when we got to Florida and I turned on the motel TV set I would learn that tens of millions of dollars of damage had been sustained by the Florida citrus and fresh vegetable growers. At 9,000 feet over the southern Bahamas it was around 25 degrees outside. The rear door to the Beech was poorly sealed and at 150 miles per hour that cold air was sweeping in over my body. 'Satellite buff found frozen in Bahamas' I imagined the news reports would read. The front seat couple, returning from a Provo Honeymoon never even noticed as I pawed my way forward sliding piled freight back onto my bench seat to make room for me to stretch out atop more freight. They were still on the honeymoon and I found it perhaps 40 degrees warmer directly behind their seat than it was at the rear of the plane. Fortunately for them I was so tired I quickly fell asleep again and I missed the show that Hegner related to me after landing. As we waited to clear US immigration I was jumping up and down trying to unthaw my frozen feet as he told me what he saw behind him. "**Right there in your airplane!**" I kept exclaiming. He assured me he was not making anything up.

After spending a long weekend with the Schneringers in Oklahoma, getting the February CSD put to bed, a new Taylor Howard Manual completed, some additions done to the latest version of the Nelson Parabolic Antenna Manual and a myriad of brochures and other literature completed for the next SPTS in Washington, D.C., I headed for Newark. This leg of the journey was to see Blonder Tongue Labs, and more specifically Ike Blonder. Now Ike and I go way back. He and Ben Tongue were well into an established business when I first met them in 1960. By 1965 when I was building my own set of cable TV

systems in California I had no trouble electing to purchase then brand new solid state BT cable TV plant gear for my four systems. It turned out I was the first to do so and I had the opportunity to be a 'field trial system' for the new BT gear. About a year after we got the systems up and running Ike and Lois came to visit Susan and I at Placerville, California. There I had shown Ike a twenty foot and a forty foot set of wire-mesh parabolics which like the present day Jim Vines Paraframe antennas were of a 'stressed design'. Except in 1965 we were catching 100-150 mile VHF and UHF TV signals with these monsters; not satellite signals. Ike told me at the time that he thought I was a good CATV system design engineer but a lousy antenna designer. He brought a new proto-type VHF log of his with him and we tried it. My twenty foot dish produced (as I recall) around 12 dB more signal on a 100 mile distant channel 7 than his log did at the time. He quickly dropped the subject of antenna designs and he and Lois and Susan spent several hours crawling all over our headend site after he learned it was once a gold processing mill. In a few hours time he and Lois had perhaps twenty pounds of quartz rocks sacked up. Now, some 15 years later, Lois would remind me of that visit and remember that they still had that sack of quartz down in the basement of their rural New Jersey home.

I have been concerned for some time that if the low power TV stations are going to amount to anything in the states that the fellow running them is going to have to have a good, quite foolproof way of collecting money for his service. I don't, personally, see a ten watt VHF station dropped into downtown Chicago making money unless it is scrambled. Plus, down here for West Indies Video I still had a decision to make as to which brand of STVencoder/decoder gadgets I was going to use. I consider Ike to be the most intelligent mind in this low power thing; he has been preaching, at every opportunity, the mistakes this country made back in the 50's by allocating big, super power VHF stations to a handful of people when there could have been 100 times as many stations each serving a distinct local need if the stations were of restricted power and coverage. Back in 1960, when VHF TV translators became 'legal' in the United States, BT was one of the first to offer a

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COOP'S SATELLITE DIGEST

P13-3/81

complete translator package. I still have a copy of a publication I put out at the time (**DXing Horizons**) that shows Ike and I on the front cover at the first-ever 'TV Translator Conference'; something my **DXing Horizons** sponsored.

Ike Blonder and company have always been visionary. Most people know only about the firm's line of MATV hardware or perhaps their CATV hardware. When Ike and Ben Tongue formed a partnership in the very earliest days of television in this country they brought to the marketplace TV amplifiers which were needed to wire up apartment buildings. From their 'loft' in Yonkers, NY they literally started an industry. In the intervening years they have grown to hundreds of employees headquartered in a 100,000 square foot facility at Old Bridge, NJ.

Interest in 'subscription' television systems began at BT way back in 1953. A US patent for a transmission of a subscription program simultaneously with a 'free' program was granted in 1962. Ten years later the FCC granted Blonder Tongue Broadcasting Company a license to operate an STV station on channel 68 and in 1974 WBTB became the nation's **first** subscription TV station. (In 1977 BT sold their interests in the station to concentrate on the development of hardware for STV.)

Ike Blonder believes in low power TV transmission systems. Until very recently he has been in the minority. He started believing in them more than 30 years ago. He also believes in satellite broadcasting systems and in fact penned an article describing the system we have today, operating at 4 GHz and serving 'small home terminals'. In that article **9 years ago** Ike urged TV distributors and dealers to be prepared for 'the future'.

The present BTVision scrambler system has been on line for many years. It is in use in the New York City STV system and in Detroit and Boston. Several of the now-under-construction STV over the air operations will also use it. For West Indies Video the system is near ideal. BT and Oak offer scrambling which does four desirable things:

- 1) The video is scrambled, using a sync suppression technique (virtually all of the over the air systems use some versions of sync suppression; by reducing the sync signal level transmitted the TV receiver cannot 'lock' onto a picture).
- 2) The audio is 'lifted' off of the normal 4.5 MHz carrier and moved to a new spot in the channel spectrum. It is recovered with the decoder.
- 3) The normal audio channel at 4.5 MHz is now modulated with what the STV industry calls a 'barker channel'. The 'barker' is fed with a tape loop that tells viewers who tune into the system during scrambled transmission why they don't have a picture or sound, and who they have to contact to 'subscribe' for the service.
- 4) And the individual subscribers are 'addressable'. That means that each decoder box has a 'bit address' code and from your transmitter site you key in the bit codes for each decoder you wish to 'unlatch' and decode the signal.

For WIV-TV addressing is essential. There is no economical way we could go around and collect monthly subscription fees from ultimately perhaps 750 homes spread over seven islands. Logic told us the subscribers had to come into central 'payment stations' on each island and pay for their service. If they do not come in on time, we had to have a way of turning off their service. Going around and disconnecting decoder boxes seemed like a bad idea.

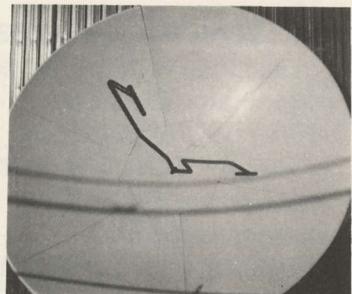
So our system will function in this manner. On the first day of each month we transmit a stream of bit codes corresponding to those subscribers who have paid for the coming month. At the decoder end the bit code for the individual decoders unlatches and then re-latches the decoder for the next month. Those not current with us do not re-latch.

BTVision does all of this with an encoder that goes at the transmitter site and a quantity of decoders in the field (one per subscriber home). The encoder we will be using is a stripped down version of the standard BT unit now in use elsewhere. The encoder system is capable of handling as many bit code addresses as the most successful STV operator will ever have on line; in excess of one million. For our purposes we are

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of codes rip through the transmitter in sequence automatically.

When you start playing around with the signal 'sync' levels, in the scrambling mode, you run the danger of getting yourself into an engineering box from which there is no escape. Since WIV originates on Providenciales and will be carried via RF heterodyne relay to four additional transmitter sites I was concerned that by the time we got our signal to the last transmitter in the chain we might have distorted the suppressed sync signal so badly the decoder would not recover it properly. Heterodyne relay systems are 'cheaper' than normal microwave demodulate-remodulate relay systems but the price you pay for lower cost is reduced modulation envelope purity.

With this in mind I studied how each of the various scrambling techniques function and came to a private conclusion I now share with you; the BTVision system appears to be capable of perhaps six hops of RF heterodyne relay without premature distortion of the video and sync waveforms. I feel far less confident that the other system available will do this. The bottom line with any marriage between low power TV and scrambling is not simply stated, but it goes like this:

- 1) **Cost effectiveness** is important; your subscriber 'base' will not be large, by full power STV measure, so you have to pay particular attention to reducing both going-in and on-going costs.
- 2) **Flexibility** may be important to you. The BTVision system, for example, allows you to 'tier' programming if you wish. That means you can 'wipe the slate clean' with the master encoder, turning everyone off, and then for a special event (such as a major fight) turn back on only those subscribers who have paid a one-time-event special fee.
- 3) **Absolute control** over the decoders may be important to you as it is to me. By being able to address each decoder individually you have the ultimate collection tool. As the Chinese say "To Tickee, No Watchee!".

As a grateful guest at the Blonder's rural NJ home Ike and I spent the evening updating one another on where low power TV and satellite interconnection was going. I had already seen several proto-type products for low power TV systems (including a new line of transmitting antennas, RF power amplifiers, a new modulator designed to be fed by satellite signals and the next generation of scrambling system) so we concentrated on who the typical users might be. "I would not be surprised to see tens of thousands of low power transmitters in operation in ten years" Ike offered. We agreed with him. BT has already heard from hundreds of people who want hardware for such systems.

In a sense our West Indies Video system down here in the Turks and Caicos Islands will be a 'test system' for BT. This will be the first low power system using the BTVision scrambler and the first anywhere to use a VHF channel (all of the stateside STV operations are presently UHF). It will be my money and BT's time that will work out the 'kinks' in the scrambler system that ultimately hundreds of CSD readers will be using in their own low power systems.

Arriving back in south Florida six days after 'landing stateside' I spent the few hours remaining before Provo flight time rounding up much needed supplies. Objects such as a 2 by 12, rack mounting screws, fresh meat, plastic pails and so on filled the rental car to overflowing. Pulling up to the parked Beech at Ft. Lauderdale Executive Airport I looked like Grapes of Wrath heading south. There I found a 400 pound roll of linoleum, several dozen cans of paint, linoleum adhesive, toilets and other materials headed for the Annex waiting on the runway. Tom and I spent two hours getting it all stuffed into the plane.

On Provo the Annex project looked grim. It was January 22nd and we were scheduled to move into the Annex on the 26th. We stretched this until the 27th but still moved in with no operating plumbing, water and other basic necessities. As I write this Susan refers to our Annex as 'Camp Cooper'. Kevin and Tasha are sleeping in one end of the half completed TV studio with the refrigerator and several tons of building supplies. One day after the building crew left we snuck the stove into the kitchen and hooked it up. That got us off the camping stove but everything we eat has the consistency of



S.P.A.C.E. General Counsel Rick Brown visited the Turks and Caicos recently and inspected the WIV Blue Mountain satellite fed transmitter site. Brown is many things; an experienced tower climber is not amongst his list of credits.

sawdust.

Living in a building that is still under construction forces some changes in your life style. The workers arrive at 7 AM each day. No room is finished so they simply come in and go to work whether you are still in bed or not. The three rooms we try to live in are swept clean of sawdust and debris each evening after the workers leave but by the next noon you are ankle deep in a new collection. By some miracle through all of this the TV station stays on the air pumping out those programs. The TV control room will be one of the first to be completed; not our preference but to the workers it has preference since they understand its function. They do not want their TV interrupted!

In spite of running two months or more behind schedule down here spirits continue high. I anticipate that by the time you read this the Annex will be just about completed and the TV studio and production facility will be operating 12 hours a day to prepare a new set of industry videotapes to be seen in Washington during the **Spring SPTS** at the Shoreham Hotel. See you there!

COOP'S ANALYSIS OF STV OPERATING SPECIFICATIONS

By some estimates more than two-dozen 'scrambling techniques' have been devised through the years for encoding of pay television programming. Some of the technology is extremely sophisticated and therefore very expensive to implement given the present state of technology. The systems in use today, on anything approaching a large scale, all attempt to scramble by doing something nasty to the sync signal levels. When the relatively delicate balance of sync to video information is distorted, on purpose or otherwise, the

television receiver finds it increasingly more difficult to extract the sync signal and bring the TV set into 'lock' with the received video information. An excellent educational series on the techniques in use appeared in **Radio-Electronics** magazine this past winter. Here is our analysis of what each system can and cannot do for you as a low power TV station operator.

System	Description
ATC (TIME)	Inserts encoding at baseband audio/video. DC sync suppression, inversion of video polarity, variable scramble rate. (System just now coming into field use.)
BLONDER-TONGUE	Suppression of sync at RF (not at baseband video/audio), fixed scrambling. Sync signals are suppressed on sine wave, fixed scrambling rate.
OAK	Sync and video are inverted, fixed scrambling rate.
TELEGLOBE	Sync and video are inverted, fixed scrambling rate.
ATC (TIME)	Audio Encoding Double sideband FM at 2 fH (FM on FM). Audio spectrum response 50 KHz to approximately 8 KHz.
BLONDER-TONGUE	Single sideband AM at 2fH (AM on FM). Audio spectrum response 50 Hz to approximately 15 KHz. Note: BTVision decoder has separate audio system built-in; customer listens to program audio through decoder speaker, hears 'barker channel' on regular TV audio system.
OAK	Double sideband FM at 4 fH (FM on FM). Audio spectrum response 50 Hz to approximately 8 KHz.
TELEGLOBE	Double sideband AM at 2 fH (AM on FM). Audio spectrum response 50 Hz to approximately 8 KHz.
ATC (TIME)	ADDRESSING SYSTEM Bits transmitted on video lines as AM. Note: In an over-the-air situation this approach may have problems with impulse noise and multi-path ghosting could also distort pulses. Requires continuous transmission addressing codes.
BLONDER-TONGUE	FSK carrier at 3.5 fH. Addressing causes magnetic latch to close. System is capable of 4 'tiers' of control.
OAK	FSK carrier at 152 kHz. Requires continuous transmission of addressing codes. System is capable of 5 'tiers' of operation.
TELEGLOBE	Six tones at 14 KHz, 18 KHz, 21 KHz, 42 KHz, 45 KHz and 46 KHz. Requires continuous transmission of tones.

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BIRD OPERATIONAL NOTES

AS PREDICTED last month in CSD Chinese had decided **not to buy** US satellite hardware (3.7-4.2 GHz birds, receive terminals), blaming 'change in priorities' for decision. Numerous US firms freely shared their technology with Chinese delegations over past three years; some now feel whole episode was simply information gathering in nature. Chinese reportedly plan now to launch their own design C band birds (2) as early as 1982.

FAILURE of Las Vegas Entertainment Network (LVEN) to come up on schedule on COMSTAR D2 this past fall appears to have been financial. LVEN plus daytime CINEAMERICA (network for folks over 40) combo was slated to begin programming in September; kept slipping on month to month basis during fall. Parts of package, including D2 transponder, have been purchased by a Milwaukee group (American Satellite Network is their new name) and they now plan a 'launch' of the service in March or April.

MAJOR SHAKEUPS in Microdyne/AFC operation. Microdyne acquired AFC (Antennas For Communications) in stock deal earlier last year. Recent Microdyne announcement showed sales of combo unit up 35% in most recent year but profits (in particular antenna line) down. Some AFC/Microdyne **antennas** have gone up 15% or more recently.

EXPLOSIVE rush of applicants for low power TV; one FCC source says more than 2,000 applications **already in house** representing more than 500 different groups. Among those filing recently has been the **ABC TV** network (they want outlets on UHF in New York City, Chicago, Detroit, Los Angeles and San Francisco for transmission of PAY TV programs), **Ted Turner** (he says he will file for more than 100 for a combination program schedule made up from WTBS and CNN), **Dominion Network** (30 stations providing a mix of family oriented programs sent via satellite), **Southern Baptists Convention** (115 low power stations fed six hours of Christian TV nightly via satellite).

NATIONAL MICROTECH reports dealer network now has 178 participants plus 12 warehouse distributors in place; company forecasts gross sales of \$5.2 million in second quarter of this year.

SPACE SHUTTLE put back - again. Now to first part of April with indication that date could slip again.

CABLE NEWS NETWORK won battle but war is not over. FCC extended until September date through which RCA must continue to provide CNN with transponder space on F1 (TR 14). Then Atlanta Judge ruled RCA must continue to provide transponder beyond that date. RCA may appeal. Alternate for Turner was to shift CNN to another satellite (such as WESTAR) and Turner's group felt this would require their giving TVROS to hundreds of cable systems at total CNN expense of over \$5 million.

CBS CABLE plans to expand beyond new 'cultural' service scheduled for launch this coming June may involve deal with USA Network (TR 9, F1). USA recently advised C-SPAN (daytime sub-user of TR 9) that C-SPAN should be looking for alternate transponder space. Other reports indicate

CBS has been talking with USA about possible venture or purchase. CBS efforts to get additional cable services into maximum number of homes will depend largely on their ability to find transponder space on primary cable satellite (F1 now; F3 later this year).

ABC CABLE meanwhile is moving with lightning speed to get jump on CBS. First ABC service, now named 'ALPHA' looks for start about time of SPTS '81 Washington, will be slanted at cultural programming. Second service, 'BETA', will aim at women and will apparently be done with partner Hearst (Cosmo Magazine, and newspapers). Third project, 'GAMMA', reportedly will involve news and sports coverage. Each of three services will require a **separate** transponder. ALPHA likely to be on SATCOM in partnership with Warner-Amex. BETA and GAMMA are still looking for a bird home.

MANY MORE uplinks likely in Washington, D.C. area. Present C-SPAN originated uplink now operated by Communications Technology Management will get two additional 10 meter uplink units this year. Storer Broadcasting also building .5 million dollar uplink near Bren Mar, Virginia to link Washington news to its seven TV stations plus Storer owned and operated cable TV systems.

AUDIO service carried with WGN (TR 3, F1) addition; 'Lifestyle' produced by Seeburg Music features 24 hour per day 'upbeat instrumentals' of top 100 tunes. Charge is \$75 per month, with custom sub-carrier receiving package from carrier United Video extra.

CHURCH TVRO systems, priced at \$5,000, being offered by Project Look-Up in Largo, Florida. System uses 3 meter antenna.

NBC will begin using COMSTAR facilities to beam network TV programs to Los Angeles, Chicago and Houston around middle of May.

CABLE NEWS NETWORK programs now delivered into US Congressional offices in Washington, via 4.5 meter terminal donated by Turner.

TIME, INC. announcing new 'National videotext service to be distributed via satellite. Service will uplink from New York City, apparently be sold to cable TV systems and others. Time describes new service as 'a new form of video publishing'; exact technical configuration unknown but F1 transponders operated by HBO are likely to carry service.

AMERICAN BANKERS are gearing up for a satellite inter-connected network that will allow instant exchange of data, voice and video between member banks.

USE of a single transponder for two separate (unrelated) TV programs still under study by several groups. Southern Satellite Systems latest to fund study in area. Hope is that by creating system for two or more programs per transponder the 'capacity' of existing satellites can be doubled.

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Sat-tec THE LEADER IN LOW COST TVRO

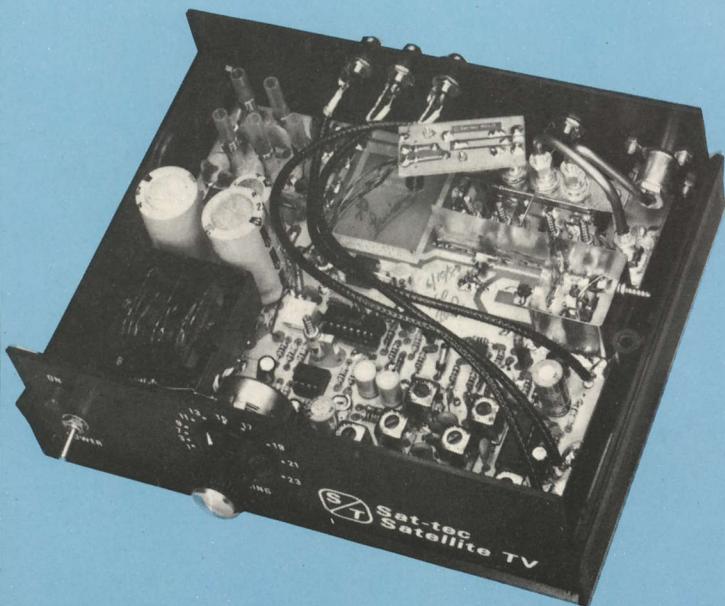
Introducing the R2 Satellite Receiver

A TV Satellite Receiver with all the features you need, at a price you can afford.



The Sat-tec R2 receiver is a versatile, consumer oriented unit designed for volume production. Easy operation and a clear, simple format makes the R2 idea for any application where non-technical users are involved. Fully frequency agile, the R2 may be used on 12 or 24 transponder birds, and since the tuning is continuous, foreign satellites such as Intelsat and Molniya can be received. A high performance AFC keeps the tuning accurate and sharp, fine tuning is not necessary. Standard one-volt P-P outputs for both audio subcarriers as well as video interface easily to any VTR or use the optional BC-1 modulator for direct TV set hook-up.

For a quality, low cost TVRO system, the Sat-tec R2 receiver can't be beat!



SPECIFICATIONS

Frequency Range: 3.5 - 4.5 GHz

Noise Figure: 12 dB, a 120° K 50 dB LNA and 10' dish provides good quality reception for most of USA.

Audio Subcarriers: 6.2 and 6.8 MHz standard, others available.

LNA Power: 15 volt at 150 Ma LNA Supply built-in.

Power Required: 110 VAC at 15 watts 50/60 Hz, 220 volt available.

Size: 8 x 6 x 3 inches, 3 lbs.

Price: \$995.00, completely wired and aligned; one year warranty.

Optional: BC-1 RF Modulator Kit, tuneable channels 3-6 with sound....\$24.95.



Sat-tec Systems

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